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THREE MILE ISLAND

SOCIO-ECONOMIC IMPACT STUDY

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COMMONWEALTH OF PENNSYLVANIA

Prepared By:

Governor's Office of Policy and Planning
504 Finance Building
Harrisburg, Pennsylvania 17120
Walter H. Plosila, Director
in cooperation with:

The Department of Agriculture
The Department of Community Affairs
The Department of Commerce
The Department of Insurance
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SUMMARY

The nuclear power plant accident at Three Mile Island in the early spring of 1979 had an immediate and significant economic impact on the seven county area surrounding the plant site. While the economy of the region returned to near normal levels shortly after the crisis period ended, the potential for continued economic costs remains.

The Three Mile Island accident was an unprecedented occurrence and clearly the worst operating incident in the more than 20 year history of non-military nuclear power use. It directly affected the lives of almost 150,000 people who felt compelled to evacuate their homes, fleeing from a potential threat which was invisible, odorless and soundless. Southcentral Pennsylvania was the focus of worldwide attention for days as the routine business of life was interrupted.

While the accident began in the early morning hours of Wednesday, March 28, public perception and reaction remained relatively low until two days later - March 30, when radiation releases from the plant heightened public awareness of the situation. Just past noon on Friday, March 30, the Governor of Pennsylvania, Dick Thornburgh, issued an advisory recommendation for pregnant women and pre-school children living within a five mile radius of the plant site to evacuate for reasons of their personal health and safety.

The Governor's advisory triggered a gradual exodus. A study conducted by the Nuclear Regulatory Commission found that an estimated 144,000 persons evacuated from a 15 mile radius, representing 39% of the total population. In the 5-10 mile radius, 44 percent; and in the 10-15 mile radius, 32 percent. The estimated cost of the evacuation has been placed at $9.8 million, but does not include lost income or wages for the evacuating population.

The economic impacts of the Three Mile Island fall into two distinct categories: the immediate and short term impacts which were precipitated for the most part by the evacuation and which abated in the weeks and months following the end of the crisis period, and the continued potential for longer term economic costs to the public and the region which is served by TMI operating utilities. Each are discussed in summary form below.

IMMEDIATE AND SHORT TERM IMPACTS

Manufacturing - Manufacturing industries are important to southcentral Pennsylvania especially the food and kindred products industry which is a significant employer in Dauphin, Lancaster, Cumberland and Lebanon counties. Other important area industries include printing, publishing and allied industries, and non-electric machinery.

The TMI accident had a significant but brief impact on manufacturing enterprises within an approximate 20 mile radius of the plant. Based on an extrapolation of data collected by the Pennsylvania Department of Commerce it is estimated that:

- *$7.7 million in value of production was lost or an average $6,725 per establishment.*
- *$1.5 million was lost in wages or an average $15 per employee.*
- *188,000 in man hours of work were foregone or an average 1.8 hours per employee.*

The accident also caused some disruption in supply of materials and marketing of products and dislocations in employment in manufacturing firms, but their impacts were transitory.

Nonmanufacturing - Nonmanufacturing firms also form a significant component of southcentral Pennsylvania's economic base with retail trade and services comprising almost two-thirds of all firms in this sector. In total, the TMI accident caused greater economic losses to this sector than to manufacturing, primarily due to the evacuation which caused the loss of customers who subsequently decreased the demand for goods and services.

Overall, it is estimated from an extrapolation from data collected by the Pennsylvania Department of Commerce, that in the seven county area:

- *$74.2 million was lost in business or an average sales or $3,763 per establishment.*
- *$5.5 million in wages were lost or an average $21 per employee.*
- *1.1 million man hours of work were foregone or an average 4.0 hours per employee.*

Nonmanufacturing firms also experienced disruption in supply and marketing and the pattern was similar to manufacturing in that the disruptions were felt by only a small share of the total firms and were, overall, ephemeral.

For both the manufacturing and nonmanufacturing firms, it is still unclear how much of the losses experienced were absolute, as opposed to how much were recaptured by increased production, greater sales, overtime, etc., in the weeks and months following the crisis period. It is apparent that some, but certainly not all of these losses were mitigated in this manner.

By late May, 1979, there were several indications that the manufacturing sector had recovered from the immediate effects of the accident. By then, no plant had any employees out of work due to TMI, there was little or no reduction in average weekly working hours and only about 10 percent of the establishments reported factory orders were below normal or felt there was some type of "image effect" in their product. While there may have been some small lingering effects of TMI (i.e., "product image" may have caused some factory orders to be below normal) it is more than likely that other economic factors were creating sluggish economic conditions impeding a return to normal business levels in the TMI area.

Similarly, the nonmanufacturing sector had mostly recovered from the immediate effects of TMI by the end of May. While data indicates that about one in four of the nonmanufacturing entities had business levels below normal during September, this probably reflects a slowly decaying economic condition over the summer months resulting from worsening national economic conditions. If the manufacturing study had been carried out in September, a similar condition in that sector would have probably been indicated. The lack of significant growth in manufacturing employment in the TMI area since June would tend to support this conclusion.

Agriculture - Farming is a major influence and contributor to the economic well-being of the seven county region which surrounds the TMI plant site. At the time of the accident, there was widespread public concern over the safety of agricultural products produced in the area. Extensive testing for radiation levels revealed only minute and short lived levels of radiation present which were well below allowable state and federal standards. Since the accident, no adverse radiation effects on foodstuffs, livestock or plant health have been discovered.

The farm community suffered financial losses which have been estimated, by the Pennsylvania Department of Agriculture, to range from $250,000 to $500,000. Overall, the impact was not pervasive as over 96 percent of farmers contacted in a 25 mile radius of the plant said they suffered no losses at all.

Government - Government agencies at both the state and local levels were pressed to cope with the demands created by the TMI accident. For the most part, these demands were manifested in increased personnel costs and additional expenses necessary to meet the special requirements during the crisis period.

Three counties and 34 local municipalities claimed expenditures of $113,000, related to the accident. The operating utility, Metropolitan Edison reimbursed $41,761 to twenty one (21) municipalities within a ten mile radius for certain emergency expenses (police overtime, supplier etc.) as of December 21, 1979. An additional twenty (20) municipalities have been contacted by the utility to determine their extraordinary expenses resulting from the accident. State government expenditures have been catalogued at nearly $630,000 for personnel costs and extraordinary expenses. TMI has not created, based on review of 1980 municipal budgets, any continuing costs. State revenues do not appear to have suffered from the accident, again indicating its truncated nature.

Tourism - Tourism, another important part of southcentral Pennsylvania's economic base sustained an estimated $5 million short-term loss due to the accident. These losses were distributed over convention trade, lodging establishments, bus tours, and other components of the industry. Although tourism has continued to run below previous years' levels, this phenomena has also been seen statewide and nationally. The local tourism industry feels that TMI has not played as prominent a role as other factors such as the gasoline shortage, in contributing to its decline.

Housing and Property Values - A possible impact of TMI has been a decreased number of homes sold and a longer selling period for those homes on the market within a five mile radius of the plant. These effects are not evident on the same scale in concentric rings beyond 5-10 miles, 10-15 miles and 15-20 miles. In addition on an aggregated county basis, no definitive adverse pattern was evidenced. In addition, housing sale prices in the five mile radius have not appreciated at the same level as those in the other radii since the accident. Data for August, 1979 (the latest available month) show improvement over preceeding months indicating this impact may dissipate in time. However, new construction starts were also down in the five mile radius in the months following the accident.

LONG RANGE IMPACTS

A primary long range impact of the TMI accident is the potential for continued higher electricity costs for Pennsylvania ratepayers served by Metropolitan Edison and its corporate sister, Pennsylvania Electric. With both TMI nuclear units in an outage status, Metropolitan Edison power generating capacity has been reduced by 38 percent, and Pennsylvania Electric's by 13 percent. To compensate for this deficit, the two utilities have been purchasing power from other interconnected generators at an estimated cost of $22 million per month, or $264 million per year.

The Federal Department of Energy has estimated that the average monthly cost for a residential customer has increased at least $7.50 due to this situation. The increased electricity prices can also have a significant impact on commerce and industry. Approximately, one-third of all manufacturing and nonmanufacturing firms contacted said their expansion or new investment plans could be affected by a ten percent increase in electricity costs. An increase of 25 percent or greater according to these firms could more dramatically alter expansion/investment plans. Twice as many nonmanufacturing firms as manufacturing firms indicated that their expansion plans would be affected by a 25% or greater rate increase.

Continued increased electricity rates could also place the Metropolitan Edison-Pennsylvania Electric service areas, which encompasses a wide geographic portion of Pennsylvania at a competitive disadvantage for location of new firms.

On a general level without considering electricity prices, an estimated two-thirds of all manufacturing and over three-quarters of all nonmanufacturing firms would make new investments regardless of their experiences with the TMI accident. This willingness to expand and make new investments in southcentral Pennsylvania, (assuming no major increases in electricity prices) is a strong indicator of optimisism and confidence in the region.

As a result of the TMI accident, a number of insurance claims and legal actions have been generated. To date, only relocation and wage loss claims amounting to 1.3 million for those persons falling within the criteria of the Governor's advisory have been settled. A number of claims and law suits, including class actions have been filed by government agencies and business concerns which suffered losses during the crisis period. Given the status of federal court dockets, the unique nature of the accident and the substantial and unprecedented amount of financial damage alleged, it is anticipated that it will take years to ultimately resolve these claims.

THREE MILE ISLAND

SOCIO-ECONOMIC IMPACT STUDY

Study Design

An unprecedented occurrence, the worst operating accident in the history of non-military nuclear power, developed at the Three Mile Island (TMI) nuclear plant on March 28, 1979. The resulting crisis was a focus of world wide attention for days. The accident directly affected the lives of almost 150,000 persons who temporarily evacuated the area surrounding TMI, and for some resulted in altered lifestyles and perceptions. Real and imagined threats to public health and safety, created by the accident, impacted social and economic systems in southcentral Pennsylvania.

The purpose of this study is to: (1) provide a record through research and cataloging of this unique incident's social and economic impact on southcentral Pennsylvania and (2) develop from the record a strategy for mitigation of confirmed adverse findings.

A consortium of Commonwealth agencies, and the special Pennsylvania Commission to Study and Evaluate the Consequences of TMI, appointed by Governor Dick Thornburgh, and chaired by Lieutenant Governor, William W. Scranton, III, have joined together in conducting the study. Coordination of the study is being managed by the Governor's Office of Policy and Planning. Other consortium agencies include: the Department of Agriculture, the Department of Commerce, the Department of Community Affairs, the Department of Insurance, the Department of Labor and Industry, and the Department of Revenue.

A final consolidated report will be published in June of 1980. The undertaking of this study is just one component of the Commonwealth's overall response to the Three Mile Island incident. Separate and extensive projects to study health, mental health, emergency preparedness and environmental questions raised in the wake of TMI are being addressed by other state agencies.

Nature of the Impact Area - The Three Mile Island nuclear power plant sits in the middle of the Susquehanna River about ten miles south of Harrisburg, the State capitol. The surrounding countryside contains the Commonwealth's most productive farmland, several small and medium sized cities, a prosperous industrial structure, a strong governmental presence (emanating from Harrisburg, the State capitol and U.S. Department of Defense facilities nearby) and a relatively well diversified economic base. Agribusiness, benefiting from the area's excellent soils, is a major contributor to the area's economic well-being. Other assets include excellent transportation facilities, as evidenced in the location of many warehousing and transport-dependent enterprises and a proud historic past which precedes the American Revolution.

Three medium size cities - Lancaster, York, and Harrisburg - lie within or just outside a 20 mile radius of the plant site.

In contrast to the sharp, angular hills and wall-like mountains which dominate so much of Pennsylvania, the greater Three Mile Island area is a rich fertile land of valleys and rolling hills. Farms in the immediate area are intensively cultivated in crops, pasture and orchards and are well maintained. While the area's cities contain pockets of high unemployment and low per capita income, they are, for the most part, like the smaller towns and villages, well maintained and timeless. Tourism is important to the greater TMI area, especially in Hershey and Lancaster.

Population within the 20 mile radius of the plant site stands at an estimated 682,400 persons.[1/] Within a five mile radius the population is almost 38,000 persons.[2/] Population for the other rings is shown in Table 1. This area, a part of a seven county southcentral Pennsylvania region, is one of the fastest growing in the state. Once largely rural and undeveloped, this area is experiencing significant urbanization, steady commercial, industrial and residential development, especially in the suburban areas surrounding the major cities and towns. Several of the inner cities, most notably Lancaster, are enjoying substantial rehabilitation and revitalization. Agricultural activity, however, still accounts for over one-half of the region's land use while another third remains in forest or open space uses.

The manufacturing of food and kindred products provides a major source of employment in the 20 mile radius of TMI. This segment is the leading manufacturing employer in Dauphin County, providing 6,470 jobs in 1975, with 31 percent of its manufacturing employment in the food industry. In Cumberland, Lancaster, and Lebanon Counties food and kindred products average around ten percent of all manufacturing jobs, a significant component. Other sectors which predominate include printing, publishing and allied industries, and non-electrical machinery.

The TMI area is stronger economically than the State as a whole. Counties within the impact area have fewer families below the poverty level. Labor force participation rates in the TMI impact area are higher than the State rate for both males and females.

1/ Calculated from U.S. Bureau of Census unpublished 1977 population for minor civil divisions in Pennsylvania.

2/ Pennsylvania Health Department Census of the TMI Five Mile Radius, unpublished data.

Table 1

Population Estimates for the TMI Impact Area

	Estimated Population
0-5 Mile Radius	37,842[a/]
5-10 Mile Radius	127,272[b/]
10-15 Mile Radius	204,375[b/]
15-20 Mile Radius	312,911[c/]
0-20 Mile Radius	682,400[c/]

a/ Based on Pennsylvania Health Department Census.

b/ Estimated from the U.S. Nuclear Regulatory Commission Telephone Survey.

c/ Derived from the U.S. Bureau of the Census unpublished data for minor civil divisions in Pennsylvania.

Data for 1976 indicates that all of the seven impacted counties had unemployment rates below the state average of 7.9 percent, with Lancaster County exhibiting the lowest unemployment rate of 5.1 percent. Except for the Harrisburg Standard Metropolitan Statistical Area (SMSA), total unemployment rates in general were higher among females, nonwhite, black and minority groups. Even among these, the rates were below the state average, except for Adams County. (See table 2).

In reviewing occupation employment patterns, Harrisburg with its state government employment, has a higher white collar employment rate than the State average. Blue collar rates in Lebanon, Lancaster, and York Counties, by comparison, exceed the Pennsylvania rate. The figures for Lancaster County reflect the significance of the agricultural sector of the economy; service employment in Lebanon County is above the State average and well above the remaining counties in the TMI impact area. (See table 2).

Table 2

Selected Labor Force Statistics: 1976

	Adams	Harrisburg SMSA*	Lancaster	Lebanon	York	Penna.
Unemployment Rate:						
Total	7.1	5.4	5.1	6.7	6.4	7.9
Female	10.1	5.1	6.3	7.4	6.7	8.5
Nonwhite	16.8	10.5	10.5	16.3	14.2	15.5
Black	17.1	10.0	11.4	15.0	14.5	15.7
Minority Group**	16.7	11.0	10.8	13.3	14.3	15.6

Source: Table prepared from data published by Pennsylvania Bureau of Employment Security in Annual Planning Report series for fiscal year 1978.

* Comprised of the counties of Cumberland, Dauphin, and Perry. Separate data for each county not available.

** The minority group category is comprised of blacks, other nonwhites, and Spanish-Americans. Some duplication is possible since Spanish-American may include nonwhite races in addition to white.

Table 3

Employment by Occupation,
Percent Distribution: 1974

Labor Market Areas	White Collar	Blue Collar	Service	Farmers and Farm Workers
Harrisburg[1/]	52.5	33.7	12.0	1.7
Lancaster	38.2	43.2	12.6	6.0
Lebanon	39.5	42.6	15.5	2.4
York[2/]	39.6	47.1	10.5	2.8
Pennsylvania	47.1	39.1	12.0	1.7

Source: Table prepared from Pennsylvania Department of Labor and Industry, Bureau of Employment Security, Pennsylvania Occupational Projections (Harrisburg, Pa., December, 1976).

[1/] Includes Cumberland, Dauphin, and Perry counties.

[2/] Includes Adams and York counties.

IMMEDIATE AND SHORT TERM IMPACTS

In the early morning hours of Wednesday, March 28, 1979, Three Mile Island's number two nuclear reactor suffered the failure of several water pumps. This seemingly minor event triggered the subsequent accident which "escalated into the worst crisis yet experienced by the nation's nuclear power industry".[1/] In the days that followed the situation was compounded by" . . . equipment failures, inappropriate procedures and human errors and ignorance" (ibid) and culminated just past noon on March 30, 1979, when the Governor of Pennsylvania issued an advisory for pregnant women and preschool children living within a five mile radius of the plant to evacuate.

Evacuation - Preliminary results of a public opinion survey of 1,500 households found that the Governor's advisory resulted in the evacuation of an estimated 144,000 persons from a 15 mile radius of the Three Mile Island Plant.[2/] This accounts for about 39 percent of the total estimated population living within a 15 mile radius of the plant. It is also estimated that 60 percent of the population within a 5 mile radius of the plant evacuated. In a 5-10 mile radius, 56,000 persons or 44 percent evacuated. In a 10-15 mile radius which contains most of the greater Harrisburg area, 67,000 persons or 32 percent evacuated.

The majority of those who evacuated did so on March 30, the day of the Governor's advisory. The NRC study found, surprisingly, that a significant portion of the evacuating population left prior to March 30: 17 percent in the 5-10 mile ring and 14 percent in the 10-15 mile ring. The medium date the evacuees returned was, April 4, 1979, indicating an average evacuation period of five days. While the great majority of those evacuated remained in Pennsylvania (72 percent) 21 states in all received evacuees, including those as far away as Florida, California and Oklahoma.

The total estimated economic cost of the evacuation has been placed at $9.8 million. This cost does not include lost income for those who evacuated or for those who remained but were unable to work for one reason or another. The average evacuation expense was $68 per person. Of this total, by mid November, 1979, almost $1.3 million had been paid to 3,158 claimants who fell within the criteria of the Governor's advisory, by the operating utility's insurance company. This amounts to an average of $384 per person indicating that these evacuees stayed away for a longer period than other segments of the evacuating population.

1/Report of the President's Commission on the Accident at Three Mile Island, October 1979, Washington, DC.

2/Three Mile Island Telephone Survey, Preliminary Report on Procedures and Findings, Nuclear Regulatory Commission, October, 1979.

Findings

The TMI accident had a short-lived but significant impact on manufacturing industries in the seven county area surrounding the plant site.

Based on an extrapolation of data collected from manufacturing establishments within an approximate 20 mile radius of the TMI plant concerning losses occurring during the first week, it was estimated that lost value of production equaled $7.7 million, lost wages for employee of these firms totaled over $1.5 million and nearly 188,000 man hours of work were lost.

It is still unclear how much of these losses were absolute as opposed to how much was recaptured by increased production and overtime in the weeks following the crisis period. It is almost certain that some recapturing occurred to overcome some of these short term losses. This factor will be explored in more detail in a final data collection effort by the Pennsylvania Commerce Department in early 1980.

The accident also affected, in a minor way, employment in the twenty mile radius during the first week or so. Since then, its impact has continued to be minimal. Disruptions in supply of materials and marketing due to the accident affected only a minor portion of the manufacturing industries and were also short lived.

Study Design

The impacts on manufacturing have been determined from data collected from a total of 363 manufacturing establishments within an approximate 20 mile radius of the TMI plant. These firms employed over 71,200 workers according to the 1977 Census of Manufacturing, 60 percent of which were in the durable goods sector. All establishments with 100 or more employees and all food and kindred products establishments were contacted, and information was sought from establishments in all the various Standard Industrial Classification (SIC) manufacturing categories (SIC 20-39). An excellent response to the Commerce Department's study was obtained - nearly 95 percent of the contacted firms responded. See Table 4 on the following page.

Table 4

Manufacturing Employment in the 20 Mile TMI Area 1/

Industry	Respondents	Universe
All Manufacturing Industries	71,269	101,749
Durable Goods	42,502	58,377
Lumber & wood products	628	1,528
Furniture & fixtures	1,727	2,414
Stone, clay, glass & concrete prod.	2,697	4,013
Primary metals	6,095	7,536
Fabricated metals	6,245	10,007
Machinery, except electrical	12,277	14,750
Electrical & electronic products	4,753	8,372
Transportation equipment	6,144	7,415
Instruments & related products	1,256	1,329
Misc. manufacturing industries	680	1,013
Nondurable Goods	28,767	43,372
Food & kindred products	6,823	12,467
Tobacco manufacturers	334	497
Textile mill products	5,940	6,360
Apparel & related products	3,686	6,967
Paper & allied products	3,085	4,046
Printing, publishing & allied indus.	3,910	5,797
Chemicals & allied products	574	795
Petroleum refining & related indus.	249	301
Rubber & misc. plastics products	1,700	2,218
Leather & leather products	2,466	3,924

1/ The area includes all of Dauphin, Cumberland, and York Counties and those parts of Adams, Lancaster, Lebanon and Perry Counties within a 20 mile radius.

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning: 1977 Census of Manufacturing.

Table 5

Establishment Distribution by Employment Size Group

	Total Establishments	0	1-19	20-99	100-199	200-499	500-999	1000+
20	148	6	64	56	10	8	3	1
other SIC's	993	66	429	314	75	79	17	13
AL	1,141	72	493	370	85	87	20	14

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning.

The total universe for this study was 101,749 employees in a total of 1,141 establishments. Adjustment and extrapolation of the data was accomplished for each 2-digit SIC group and by each of seven employment size groups. These employee size groups are: zero employees (for example, self-employed); 1-19 employees; 20-99; 100-199; 200-499; 500-999; and 1,000 or more employees. The number of establishments by employment size groups is shown in Table 5 above. This was done to estimate the economic impacts for all establishments and employment in the manufacturing "universe".

As part of this study, there was a special emphasis placed upon the food and kindred products industry (SIC 20) in order to thoroughly examine the TMI accident's impact on food processing plants. A hundred percent return was sought from all food and kindred product establishments. Unfortunately, some of the firms not responding were the largest employers. To further study the impact of TMI on food processing, ten large food processors outside the 20 mile radius which utilize foodstuffs produced within the 20 mile radius of TMI were also contacted. These involved large dairies, and fruit and vegatable processors located elsewhere in Pennsylvania and Maryland.

Immediate Impacts

The immediate impacts of TMI on manufacturing industries occurred essentially in the first week follwing the incident. The first week began with the Friday, March 30, 1979 advisory of the Governor of Pennsylvania to families with pre-school children and pregnant women to evacuate the area in a 5 mile radius of the plant and extends through April 6, 1979. During the second week, on April 9, 1979, the Governor canceled his advisory concerning evacuation. It is essential to recognize this time period since the Department of Commerce's study found that most manufacturing firms had returned to

normal production by April 4, 1979, and the remaining firms returned to normal production soon thereafter. Therefore, the immediate effects on employment, wages, and production were short lived and were mostly concentrated during the first week. However, other impacts may have longer term aspects, these are discussed in this section under the heading "short term impacts" and in subsequent sections dealing with long range impacts.

TMI related losses to manufacturing establishments during the first week are presented in Table 6. It is interesting that the greatest percentage of losses took place in large establishments - those employing 100 or more workers, even though they represent only 18 percent of the total number of establishments. They also account for 79 percent of the total employment.

Table 6

Losses in First Week by
Number of Establishments by Size

	Total 1/	Average per employee 2/	Under 100 Employees	Over 100 Employees
Man Hours Lost	187,973	1.8	46,951	141,022
Wages Lost	$1,515,509	$14.89	$506,702	$1,008,807
Value of Production Lost	$7,672,820	$75.41	$845,815	$6,827,005
Number of Establishments	1,141		935	206

1/ Includes totals for all manufacturing establishments including food and kindred products (SIC 20).

2/ Total days lost, wages or value of production in universe divided by total 1977 employment.

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning.

Losses in man hours, wages, and value of production which occurred during the first week following TMI in the food and kindred product establishments are shown in Table 7. On an average per employee basis, these establishments lost less than the average experienced for all other manufacturing groups.

Table 7

FIRST WEEK LOSSES - FOOD PROCESSING
AND COMPARISON TO OTHER MANUFACTURING

		Average Loss per Employee		
	Total Loss In SIC 20	SIC 20	Non-Food SIC's	All Manufacturing
Man Hours	12,937	1.00	2.00	1.8
Wages	$ 71,905	$5.77	$16.17	$14.89
Value of Production	$143,691	$11.53	$84.33	$75.41

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning

The Department of Commerce also found that none of the firms responding to its study of TMI's impacts had any employees out of work by the time the Department gathered its data during the last two weeks in May, again suggesting that the losses in wages and value of production were confined largely to the immediate period following the accident.

Man Hours Lost - Overall, employees in manufacturing were away from work for about two hours during the first week. But this is just the average - some employees lost more time from work. For example, the average man hours lost per employee in all categories except food and kindred products was nearly five hours for establishments having 500 to 999 employees. Although employees in food and kindred products lost an average of one hour for all establishments in this category, employees in those small food firms (0-19 employees) lost 2.3 hours.

Wages Lost - The absenteeism and layoffs in manufacturing resulted in an average per employee wage loss of around $15. As was the case in lost man hours, the food and kindred products workers seemed to have lost less wages during the incident. In some other establishments losses were greater, for example, non food firms employing between 500-999 workers lost an average of about $31 in wages per employee, which was around twice the overall average ($15) for all manufacturing firms. Average lost wages in food establishments amounted to six dollars, but for some food firms (20-99 employees) the losses were up to $13 in wages per employee.

Losses in Value of Production - The overall average loss in value of production for all manufacturing establishments was $75 per employee. But those large non-food firms (500 to 999 employees) mentioned previously, which experienced the greatest average time and wages lost per employee also had the greatest loss in value of production - an average of almost $350 per employee. The average loss in value of production for all establishments having more than 100 employees was $85 per employee. Contrastingly, all of the food and kindred products establishments sustained an average value of lost production of only $12 per employee. However, small food manufacturing establishments in the employee range of 20 to 99 did lose an average of $43 per employee.

Supply and Marketing Disruptions - During the time period immediately following the TMI incident, there was some disruption in supply of raw materials and other products necessary to carry out the manufacturing process. Disruptions in the marketing of finished products or goods to consumers or users also occurred. However, these disruptions were not a widespread or a pervading problem.

The Department of Commerce's study found that almost seven percent of the total manufacturing firms experienced disruptions in supply of products purchased and almost 12 percent experienced disruptions in marketing of products sold. (see Table 8) These disruptions mainly affected small establishments probably because they tend to both obtain materials and market their products locally.

Of the firms affected by disruptions in supply of materials, 88 percent had less than 100 employees. These smaller firms probably would feel the inconvenience of supply disruptions more than the larger firms since they are less able to maintain a large inventory of needed materials. Within this size group of less than 100 employees, nearly one-half of those operated by the self employed experienced disruptions in their supplies of products purchased.

Eighty-nine percent of the firms experiencing disruptions in marketing also had less than 100 employees. Such firms probably were affected by having capital tied up in undelivered products.

Disruptions in marketing were felt more by food and kindred product establishments than the average for all the other SIC categories. (See table 8) Food and kindred product establishments experienced twice as many marketing disruptions as they did disruptions in obtaining supplies.

Table 8

Industrial Dislocation

	Total Disruptions	% of Total Establishments	Less Than 100 Employees	% of Total Establishments	More Than 100 Employees	% of Total Establishments
Disruption in Receiving Supply of Products						
SIC 20	11	7.4	10	7.9	1	4.6
All Other SICs	67	6.8	59	7.3	8	4.4
TOTAL	78	6.8	69	7.4	9	4.4
Disruption in Marketing Products						
SIC 20	22	14.9	17	13.5	5	22.7
All Other SICs	111	11.2	101	12.5	10	5.4
TOTAL	133	11.7	118	12.6	15	7.3
Number of Establishments						
SIC 20	148	100.0	126	85.1	22	14.9
All Other SICs	993	100.0	809	81.5	184	18.5
TOTAL	1141	100.0	935	82.0	206	18.0

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning.

There were several reasons for these marketing and supply disruptions. Because of the voluntary evacuation there was less capability of providing timely delivery of materials for processing or the shipping of finished products. In addition there would have been a reduced market for manufactured products since some outlets closed temporarily (e.g. stores and restaurants). People in the area became more selective in their purchases; this selectivity particularly affected the food processing establishments. Disruption in supply and marketing during the first week was more of a problem for the food establishments than it was for the average of all the non-food processing categories. The disruption in marketing of food products was experienced by twice as many establishments as those experiencing disruption in obtaining supplies of products. It is likely that the marketing problem resulted from immediate consumer resistance at the time of the accident to locally produced agricultural products and to temporary losses of sales because of a decreased demand resulting from people having evacuated the area. Several dairies in the Harrisburg area reported a short lived decrease in sales. The fact that numerous restaurants and schools in the area were closed for several days would also account for some decrease in consumer demand. Aside from consumer resistance to food products, the supply of certain raw materials sensitive to potential radiation could also have been subject to resistance by manufacturers.

The Teamsters strike which began during the immediate period following the TMI incident, also impacted a few manufacturing firms. The degree to which the study's findings are influenced by the strike cannot be determined.

In summary, supply and marketing dislocation effects on industry at the time of the TMI incident were minimal, affecting about 10 percent of the manufacturing establishments. Some firms experienced dislocations in supply and delivery at the time of the event due to evacuation of the area and some consumer resistance over safety concerns.

Because of TMI's special potential for causing adverse effects on the food processing industry, the Commerce Department study also assessed the impacts on ten large food processors located just outside the 20 mile radius as mentioned earlier. During the height of the incident, these firms had no problems relating to man hours lost or value of production lost. But there was some consumer resistance experienced by a few of the dairies resulting from consumer concern over the safety of milk obtained from the TMI area. In some cases, the milk from within the 20 mile radius was kept separate so that customers could buy milk from outside the area if they so chose. In other cases, local milk was processed into cheese or dried milk. Overall, however, the study found that, as of the end of May, no serious problems were being experienced.

Unemployment

Claims data from the Office of Employment Security in the Pennsylvania Department of Labor and Industry also confirm that the effects of the incident were short lived. Indeed, except for the first several weeks, the TMI incident has had little remaining impact on employment and unemployment rates in the area, and even during its initial stage the impact was minimal.

Records of the Office of Employment Security reveal that there were 721 initial claims and 1,489 continued claims filed (as of October 13, 1979), due to the TMI incident. These claims were filed in the Harrisburg, Lebanon, Lancaster and York local offices where the bulk of the claims related to TMI were handled. These offices served the claimants within an approximate 20 mile radius of TMI.

Initial claims represent those filed by someone recently unemployed or a person who has a previously disrupted employment record making an additional claim. Not every initial claim becomes eligible for compensation. The number of initial claims represents a rough approximation of those individuals who were unemployed because of the TMI incident. A note of caution, however, is necessary - in order to be eligible for unemployment compensation, the claimant had to be told by his employer not to report for work. Furthermore, the claimant had to remain in the area. Therefore, this data does not reflect those who voluntarily evacuated the area while their employer remained in operation.

A continued claim represents a person who has filed an initial claim and who returns in the second week to the unemployment office because he has been unemployed for at least part of a week. However, some of the continued claims represent persons who were out of work for several weeks.

Table 9 shows that 482 persons in the manufacturing sector filed initial claims - comprising 68 percent of the total. Although there were 457 continued manufacturing claims, their share of the total was only 31 percent of all continued claims. This decrease in percentage share (in manufacturing) is attributable to the occurrence of more continued claims in the nonmanufacturing sector. Most of the nonmanufacturing continued claims were in the construction category.

Most of the claim activity shown in Table 9 occurred in the month of April, 1979, with the exception of the construction industry: About 75% of the initial claims (about 540) were made in the first week, and the bulk of these were partial claims which represent only a few lost days of work. Since only 482 of the initial claims were in the manufacturing sector, and since the total 1977 manufacturing employment in an approximate 20 mile radius (Table 4) is about 100,000 employees, the share of manufacturing employees filing initial claims is well below one percent of the total manufacturing employment.

The construction claims as noted earlier do not encompass the general construction field such as home building, but rather reflect claimants engaged at TMI in specialized maintenance.

Table 9

Unemployment Claims Related to TMI,
as of October 13, 1979

Industry	Initial	Continued
Apparel	13	13
Printing & Publishing	4	4
Fabricated Metals	1	1
Machinery (except electrical)	1	1
Transportation Equipment	27	27
Misc. Manufacturing	436	411
Total Manufacturing	482	457
Agriculture Services	2	7
Construction	152	942
Transportation & Public Utilities	3	10
Services	82	73
Total Nonmanufacturing.	239	1,032
TOTAL	721	1,489

Source: Department of Labor and Industry, Office of Employment Security.

An analysis of data provided by the Department of Labor and Industry concerning changes in total employment and unemployment does not show any notable effect of TMI. Table 10 lists month-by-month levels of total employment and unemployment since May and shows the monthly changes over those levels experienced in March. Data for all seven counties which are usually considered as possibly affected by the accident have been included.

In spite of fluctuations which have occurred over the six month period since the accident, the data indicate that overall employment levels have consistently remained higher in all months and in all counties than those which were occurring during March 1979. And, the overall change in unemployment from March through September has been down, except for Lebanon County. An increase in unemployment rates occurred in June, but this reflects the usual seasonal entry of students into the labor market, amplifying the total number of unemployed during that period of time.

Of importance is that fact that there was still a growth of total employment over the period including May, June, and July. It would be during this time that one might have expected some drop in total employment due to TMI. Yet this did not occur. Instead, there was an overall increase of almost 20,000 jobs over the March level. This increase in employment was not as large as would normally have occurred, but this is a result of the general economic situation rather than any relationship to the TMI incident.

After July, there was a general downturn in total employment levels responding to the "slippage" in the national economy which had been occurring since the second quarter of 1979. Decreases in business levels and consumer spending brought on by high rates of inflation, high prices, rising interest rates and threats of a recession began to take their toll on employment gains.

Still, the September levels of employment in all counties were higher than those in March and, in most cases, the rates of unemployment continued to decline from Juen into September. The TMI area's local economy can be credited with stability and strength in spite of the developing onerous national and state economic conditions.

Short Term Impacts

Impact on Factory Orders - According to the Department of Commerce's study, in late May, 78 percent of the manufacturing firms reported that their factory orders were normal since the accident. At the same time, no plants reported any employees out of work due to TMI. Only 10 percent (118 establishments) were estimated to have had orders below normal. Most of these latter firms (103) were those with less than 100

TABLE 10

TOTAL EMPLOYMENT

County	March	May	Mar-May Change	June	Mar-Jun Change	July	Mar-Jul Change	August	Mar-Aug Change	Sept.*	Mar-Sept Change
Dauphin	105,800	106,900	+1,100	107,700	+1,900	110,500	+4,700	109,300	+3,500	107,800	+2,000
Perry	15,900	16,000	+ 100	16,100	+ 200	16,600	+ 700	16,400	+ 500	16,200	+ 300
Cumberland	81,400	82,200	+ 800	82,800	+1,400	85,000	+3,600	84,100	+2,700	82,900	+1,500
Lebanon	46,200	46,700	+ 500	47,300	+1,100	48,200	+2,000	47,200	+1,000	46,600	+ 400
Lancaster	165,300	167,100	+1,800	168,300	+3,000	170,900	+5,600	169,600	+4,300	167,400	+2,100
York	131,100	131,900	+ 800	132,200	+1,100	133,800	+2,700	132,800	+1,700	133,100	+2,000
Adams	28,500	28,700	+ 200	28,700	+ 200	29,100	+ 600	28,900	+ 400	28,900	+ 400
TOTAL	574,200	579,500	+5,300	583,100	+7,900	594,100	+19,900	588,300	+14,100	582,900	+8,700

TOTAL UNEMPLOYMENT

County	March	May	Mar-May Change	June	Mar-Jun Change	July	Mar-Jul Change	August	Mar-Aug Change	Sept.*	Mar-Sept Change
Dauphin	6,600	4,600	-2,000	6,200	-400	5,200	-1,400	6,000	-600	6,100	-500
Perry	1,100	700	- 400	1,100	0	900	- 200	1,000	-100	1,000	-100
Cumberland	4,400	2,800	-1,600	4,600	+200	3,500	- 900	4,100	-300	3,700	-700
Lebanon	2,600	2,000	- 600	3,000	+400	3,500	+ 900	3,000	+400	3,000	+400
Lancaster	8,600	6,400	-2,200	8,900	+300	7,200	-1,400	8,300	-300	8,400	-200
York	6,700	5,500	-1,200	7,300	+600	7,600	+ 900	6,800	+100	6,400	-300
Adams	2,200	1,500	- 700	2,400	+200	2,500	+ 300	2,000	-200	1,600	-600
TOTAL	32,200	23,500	-8,700	33,500	+1,300	30,400	-1,800	31,200	-1,000	30,200	-2,000

TOTAL RATE OF UNEMPLOYMENT

County	March	May	Mar-May Change	June	Mar-Jun Change	July	Mar-Jul Change	August	Mar-Aug Change	Sept.*	Mar-Sept Change
Dauphin	5.9	4.2	-1.7	5.5	-0.4	4.5	-1.4	5.2	-0.7	5.4	-0.5
Perry	6.5	4.4	-2.1	6.6	+0.1	5.0	-1.5	5.8	-0.7	5.7	-0.8
Cumberland	5.1	3.3	-1.8	5.3	+0.2	4.0	-1.1	4.6	-0.5	4.3	-0.8
Lebanon	5.4	4.1	-1.3	5.9	+0.5	6.7	+1.3	6.0	+0.6	6.0	+0.6
Lancaster	4.9	3.7	-1.2	5.0	+0.1	4.1	-0.8	4.6	-0.3	4.8	-0.1
York	4.9	4.0	-0.9	5.2	+0.3	5.4	+0.5	4.9	0	4.6	-0.3
Adams	7.1	4.9	-2.2	7.8	+0.7	7.8	+0.7	6.4	-0.7	5.4	-1.7

*Preliminary

employees. The 87 percent share of smaller firms with less than 100 employees having below normal orders is disproportionate in size to the 82 percent identified as small establishments. This indicates that these firms felt this impact slightly more than larger firms. Over half (56 percent) of these had depressed orders were in the 1-19 size group; this group constitutes only 43 percent of all establishments. There was no significant difference between the food processing industry (SIC 20) and all other manufacturing categories.

Factors contributing to the reduction in factory orders are difficult to isolate. Some of these firms with below normal orders may have been experiencing product image problems, and the study does indicate that could be the case. But other factors were also at work during the same period of time which could have influenced factory orders. During the month of April, some effects of the continuing strike by some steel haulers may have caused a decrease in orders in certain of the steel related establishments.

But more importantly, beginning in April, a period of national economic decline began. The U.S. Census Department's Composite Index of Leading Indicators dropped over 2.0 percent during the strike-depressed month of April; and thus began a quarter of general decline and a sluggish economy. During periods such as this, new orders and capital investments decline.

Image Problems - The estimated number of establishments in May noting an effect on the image of their product since TMI is nearly the same as the estimated number of those having factory orders below normal and the percentage share of total number of establishments is about the same (10 percent).

The losses to the firms noting an image effect is estimated to have been about 1.1 million dollars. This averages out to about a little over $10,000 per establishment experiencing the problem. For food and kindred products, eight percent of the establishments believed they were still being handicapped by an image problem.

The estimated value of losses in the food industry due to image problems is about $60,000 or approximately $4,800 per establishment. For those firms able to estimate product image losses, the largest share of the losses was concentrated in firms with 20 to 200 employees, i.e., product image problems appear to have been felt by both some of the smaller and some of the larger firms. Some of the biggest firms could not or would not estimate the dollar value of product image losses.

Summary of Findings

Immediate TMI Impacts - First Week Following Accident

Man Hours lost were estimated to be just over one million representing an average loss of 4.0 hours per employee. Service, retail trade, and construction sectors experienced the greatest losses, and among these more average per employee losses were reported by smaller employers (less than 20 employees) than by larger ones.

Lost Wages are estimated at $5.5 million, an average of $21 per employee. Smaller firms sustained the greatest average loss, $33 per employee; smaller employers in most sectors averaged more wages lost per employee than larger businesses. Of the larger employers, (20 employees and up) only those in the construction industry lost more wages per employee than their smaller counterparts.

Employees out of work or absent from work either by their own choice or because their place of employment was clsoed, totaled approximately 42,700 or 16 percent of the total number of employees in the six county area surroudning TMI. Smaller employers (less than 20 employees) indicated an average 25% out of work/absent compared to a 12% average for larger employers. Services, transportation and utilities, construction, and retail trade reported a greater percentage out of work/absent than other sectors.

Supply and marketing disruptions were experienced by only a small portion of the businesses. Five percent of the businesses reported supply disruptions and 12 percent marketing disruptions. The larger businesses had the greatest share of both supply and marketing disruptions. Retail trade, wholesale trade, and the service sectors accounted for 92% of those reporting supply dislocations and for over 98% of those in product marketing.

Value of business or sales losses in the six county area around TMI were estimated to be just over $74 million. This represents an average loss per establishment of around $3,700. Without exception, the greatest losses were experienced by the larger firms, while the total losses and losses per employee were greatest for the smaller firms. Over 85 percent of the lost business occurred in the retail trade, wholesale trade and the finance, insurance and real estate sectors.

Overall conclusion - In the immediate period, smaller firms generally experienced a greater loss of man hours, wages, and employees out of work than did larger firms. The greatest losses in all categories were reported by the retail trade and service businesses. Larger employers in most sectors had supply and marketing disruptions than smaller employers. Larger firms also lost the greatest total value of business.

Short Term TMI Impacts - April, 1979 through September, 1979

Business interruption effects seem to have disappeared by Septemberl, 1979. Only five percent of the businesses spoken to which reported that their business was interrupted at the time of TMI had not regained normal levels by September, 1979. Although 23 percent of all firms indicated business levels were below normal in September, 1979, this probably results mostly from factors other than the TMI accident. Over three-fourths of the 23 percent was accounted for by retail trade and services.

Average Weekly Working hours by September, 1979 were at normal levels for 88% of the businesses. The sectors reporting the greatest share of their establishments with below average weekly working hours were transportation and public utilities, retail trade and services.

Image problems were reported by less than five percent in September. Only in the wholesale trade area did the image problem appear to be noteworthy. Over 96 percent of the responding firms felt that the TMI accident would not have any long term image effects on their business.

Nonmanufacturing Employment Changes reflect little adverse impact. During April through June, 1979, employment increased in the counties surrounding TMI. But from June to September, employment in this area declined, probably reflecting the cummulative effects of a worsening economy. Moreover, the TMI area has shown less employment decline in the June to September 1979 period than the State as a whole.

Small Business Administration (SBA) assistance data shows that by mid-November, 1979, SBA had accepted 64 applications for loans in the amount of nearly $3.3 million for TMI related economic injury. Most of these were from the retail trade sector. Thus far, 22 applications have been approved in the amount of $510,000. Additional requests for aid can be made up to January 28, 1980.

Study Design

A study of TMI impacts on the nonmanufacturing sector was undertaken in September, 1979, by Pennsylvania Department of Commerce's Bureau of Statistics, Research and Planning. Data concerning the impacts of the TMI incident was obtained for firms within a six county area surrounding the TMI plant - these counties include Dauphin, Cumberland, Lancaster, Lebanon, Perry and York. The reason for the use of the six county area was the need to utilize information provided by the Office of Employment Security, in the Pennsylvania Department of Labor and Industry. This data did not permit the locating of individual establishments at the municipality level as could be done in the manufacturing sector.

It should also be pointed out that the two studies were conducted four months apart. As a result, the information about the impacts may be influenced in some cases by economic factors other than TMI which have emerged during the summer months.

The universe of entities and employment in the six county area in December, 1978 was 20,197 entities employing 267,032 persons. An entity is the total county business operations of a company operating in a county regardless of the number of establishments. The 267,032 universe of employment represents the employment in all establishments in all of the 20,197 entities. In addition, the entities and employment were disaggregated into eight two-digit nonmanufacturing sectors based upon the Standard Industrial Classification Code.

Table 11 identifies the eight nonmanufacturing sectors and shows how the entities are distributed among four employment size groups. The most significant fact is that 87.5 percent of the entities are small, 17,663 out of 20,197 entities employ less than 20 workers. The only exception is the mining sector which has a greater percentage of entities employing over 20 workers.

In assigning entities into nonmanufacturing sectors, each was identified according to the major activity which it performs. The universe does not include firms representing self-employed individuals. Furthermore, the 314 entities included under the agriculture sector represent only large farms (ie., those employing 10 or more workers in a 20-week period or paying in cash at least $20,000 to employees in any one quarter) as well as those engaged in forestry, fishing, or agricultural services.

Table 11

Universe of Entities Distribution in Nonmanufacturing Study
By Sector and Employment Size Group

Nonmanufacturing Sectors	Entities	% of Total Entities	0-19 Size Group Number of Entities	0-19 Size Group % of Total Sectors Entities in Size Group	0-19 Size Group % of Total Size Groups Entities	20 and Over Size Group Number of Entities	20 and Over Size Group % of Total Sectors Entities in Size Group	20 and Over Size Group % of Total Size Groups Entities
Agriculture Forestry and Fishing	314	1.6	279	88.9	1.6	35	11.1	1.4
Mining	26	0.1	11	42.3	0.1	15	57.7	0.6
Construction	3,201	15.9	2,942	91.9	16.7	259	8.1	10.2
Transportation and Public Utilities	837	4.1	625	74.7	3.5	212	25.3	8.4
Wholesale Trade	1,604	7.9	1,306	81.4	7.4	298	18.6	11.8
Retail Trade	6,158	30.5	5,182	84.2	29.3	976	15.8	38.5
Finance, Insurance & Real Estate	1,499	7.4	1,343	89.6	7.6	156	10.4	6.1
Services	6,558	32.5	5,975	91.1	33.8	583	8.9	23.0
TOTAL	20,197	100.0	17,663	87.5	100.0	2,534	12.5	100.0

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning.

The small firms 0-19 (nearly 88 percent of the total) employ only 29 percent of the total workers. See Table 12.

An examination of the distribution of the entities and their associated employment among the eight nonmanufacturing sectors reveals that services and retail trade account for 63 percent of all firms and 61.8 percent of the total employment in nonmanufacturing. Services is the leading sector in the number of firms, while retail trade leads in the size of employment.

The Department of Commerce's study of TMI impacts on nonmanufacturing included contacting a total of 577 entities (employing 82,019 workers) out of the total universe. The Department contacted 100 percent of the entities employing 250 or more workers, 25 percent of those in the 100-249 employee range, 10 percent of those employing 20-99, and one percent of those with 0-19 employees.

The 577 entities contacted represent about three percent of the universe of entities and approximately 31 percent of the employment universe (see Table 13). The Department received data on the impacts of TMI on business operations from 401 firms. This represents a very good response (about 70 percent) and, accounts for two percent of all entities in the universe. And the employment associated with the responses was nearly 50,000 employees - about 19 percent of the employment in the universe.

When comparing the manufacturing and nonmanufacturing data collection efforts, there were roughly the same number of responses - 363 responding establishments in the case of the manufacturing sector and 401 entities in nonmanufacturing. This relative uniformity of responses was obtained, even though the percentage of the universe represented by the responses was much smaller in the case of nonmanufacturing (two percent of the entities) as compared with manufacturing (32 percent of the establishments). For employment, the nonmanufacturing responses represented about 19 percent of the total possible employment of the universe, and in manufacturing the responses represented 70 percent of the possible universe employment.

Table 12

Universe of Employment Distribution in Nonmanufacturing Study
By Sector and Employment Size Group

Nonmanufacturing Sectors	Employment	% of Total Employment	0-19 Size Group Number of Employees	0-19 Size Group % of Total Sectors Employees in Size Group	0-19 Size Group % of Total Size Groups Employees	20 and Over Size Group Number of Employees	20 and Over Size Group % of Total Sectors Employees in Size Group	20 and Over Size Group % of Total Size Group's Employees
Agriculture, Forestry & Fishing	2,885	1.1	1,125	39.0	1.4	1,760	61.0	0.9
Mining	1,402	0.5	125	8.9	0.2	1,277	91.1	0.7
Construction	23,798	8.9	11,562	48.6	14.7	12,236	51.4	6.5
Transportation & Public Utilities	26,841	10.1	3,374	12.6	4.3	23,467	87.4	12.4
Wholesale Trade	25,469	9.5	7,820	30.7	9.9	17,649	69.3	9.4
Retail Trade	91,805	34.4	26,499	28.9	33.7	65,306	71.1	34.7
Finance, Insurance and Real Estate	21,633	8.1	4,744	21.9	6.0	16,889	78.1	9.0
Services	73,199	27.4	23,408	32.0	29.8	49,791	68.0	26.4
TOTAL	267,032	100.0	78,657	29.5	100.0	188,375	70.5	100.0

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning.

Table 13

Nonmanufacturing Study
TMI Impact Area

Entities

Employment Size Group	Universe	Contacted	% of Universe Contacted	Responses	% of Universe Responding
0-19	17,663	181	1.0	123	0.7
20-99	2,140	218	10.2	160	7.5
100-249	291	75	25.8	54	18.6
250 +	103	103	100.0	64	62.1
TOTAL	20,197	577	2.9	401	2.0
		Employment			
0-19	78,657	736	0.9	609	0.8
20-99	83,882	8,430	10.1	6,189	7.4
100-249	42,907	11,267	26.3	7,758	18.1
250 +	61,586	61,586	100.0	35,406	57.5
TOTAL	267,032	82,019	30.7	49,962	18.7

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning.

The extent of the responses by nonmanufacturing sector (responses as a share of the total entities and employment in the universe) is shown in Table 14 below.

Table 14

Extent of Responses by Nonmanufacturing Sector

Sector	% of Total Entities	% of Total Employment
Agriculture, etc.	1.9	9.9
Mining	11.5	10.3
Construction	1.2	6.5
Transportation, etc.	4.2	28.5
Wholesale Trade	3.0	15.0
Retail Trade	2.1	13.0
Finance, etc.	2.7	40.3
Services	1.6	21.7
TOTAL	2.0	18.7

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning.

There is some variation in the extent of the responses - the range in share of total entities responding goes from just over one percent to just over eleven percent. But the share of universe employment covered is much more variable, ranging from less than seven percent (construction) to over 40 percent (finance, insurance and real estate). The difference in the ranges means that, in several cases, a greater share of the larger entities responded. Hence, one could expect to have results more typical of the universe for each sector and less subject to variation where the greatest number of entities responded.

In order to present the estimated economic impact data for all nonmanufacturing entities and all employment in the six county area, the Department inflated the data obtained from the responses. This extrapolation was done for each of the four employment size groups within each of the sectors and by each of eight nonmanufacturing sectors. In this way, a total sectorial response and a total for each employment size group for all sectors could be obtained. Generally, the extrapolation of the respondent's data to the nonmanufacturing universe was obtained by using either 1) the ratio of total universe employment in each size group and sector to the employment in the corresponding respondent size group and sector or 2) the ratio for the number of entities in the same way.

Appendix A which identifies the two-digit breakdown of the component segments of the sectors according to the Standard Industrial Classification is included at the end of this section.

Immediate Impacts

The period for which immediate impacts of TMI were sought by the Department of Commerce was the period extending from March 30 through April 6, 1979. This includes the time during which the Governor issued his advisories with respect to voluntary evacuation and other matters related to the incident, such as the closing of schools within the five mile radius. It extends almost to the time when the advisories were lifted on April 9, 1979. The immediate impacts are therefore generally synonymous with the height of the accident during the first week.

Employment Effects - The immediate impacts of the TMI incident can be seen by examining the estimated amount of man hours lost by the various eight sectors in nonmanufacturing and associated wage losses. Man hours lost during the March 30 to April 6, 1979 period are shown in Table 15 on the following page. There were a total of 1,064,841 estimated man hours lost by all nonmanufacturing entities; this represents an average loss of 4.0 hours per employee. However, there was a distinct difference in the amount of losses depending upon the size of the entity - for example, small entities with less than 20 employees lost an average of 6.6 hours per employee while entities employing more than 20 persons lost an average of only 2.9 man hours. It appears that the small firms bore the greater share of the man hour losses, with some sectors feeling more pronounced losses per employee than the small firm average, such as transportation and public utilities, and services. This tendency toward small firms having the larger man hour losses could be linked to the occurrence of decisions to let persons off work being made by local management, while the larger firms decisions may have had to be made at more distant locations.

Wages Lost - The man hour losses, of course, resulted in lost wages. An estimated $5.5 million were lost during the immediate period of the incident (see Table 16). This averaged out to over $20 per employee for all entities irrespective of size. The employees in smaller firms (less than 20 employees) sustained an estimated loss of around $33 per employee, while those in larger entities averaged about $16. There were significant differences among sectors - transportation and public utility employees in smaller entities experienced an average wage loss of over $100, while employees in similar small wholesale trade entities lost only around $12 per employee. One sector were size of entity was relatively unimportant was the construction industry, where average wage losses per employee were about the same in both small and large entities.

Table 15

Man Hours Lost First Week

Sector	Total	Average per Employee[1/]	By Entities with less than 20 Employees	Average per Employee[1/]	By Entities with more than 20 Employees	Average per Employee
Agriculture, etc.	1,935	0.7	755	0.6	1,180	0.7
Mining	0	0	0	0	0	0
Construction	132,438	5.6	71,073	6.2	61,365	5.0
Trans. & Public Utilities[2/]	84,479	3.1	35,428	10.5	49,051	2.1
Wholesale Trade	70,069	2.8	31,573	4.0	38,496	2.2
Retail Trade	345,060	3.8	156,221	5.9	188,839	2.9
Finance, etc.	71,438	3.3	28,263	6.0	43,175	2.6
Services	359,422	4.9	191,865	8.2	167,557	2.3
TOTAL	1,064,841	4.0	515,178	6.6	549,663	2.9

[1/] Total man hours lost in universe divided by the December, 1978 employment.

[2/] Does not include data for Metropolitan Edison which is a unique case.

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning.

Table 16

Wages Lost First Week

Sector	Total	Average per Employee[1/]	By Entities with less than 20 Employees	Average per Employee[1/]	By Entities with more than 20 Employees	Average per Employee[1]
Agriculture, etc.	9,644	3.3	3,761	3.3	5,883	3.3
Mining	0	0	0	0	0	0
Construction	1,031,581	43.3	525,393	45.4	506,188	41.4
Trans. & Public Utilities[2/]	661,827	24.7	347,425	103.0	314,402	13.4
Wholesale Trade	232,630	9.1	95,795	12.3	136,835	7.8
Retail Trade	1,943,310	21.2	702,302	26.5	1,241,308	19.0
Finance, etc.	243,811	11.3	117,090	24.7	126,721	7.5
Services	1,351,525	18.5	762,216	32.6	589,309	11.8
TOTAL	$5,474,328	20.5	2,553,982	32.9	2,920,346	15.5

[1/] Total wages lost in universe divided by December 1978 employment.

[2/] Does not include data for Metropolitan Edison which is a unique case.

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning.

Work Lost - Another way of examing the immediate employment effects of the incident is to look at the data concerning the number of employees out of work at some time during the March 30 to April 6, 1979 (first week) period. Table 17 which follows shows that the overall nonmanufacturing sector experienced an estimated 42,700 persons out of work due to TMI during the first week. This represented 16 percent of the total number of employees in the six county area. The data indicates that smaller entities had one-quarter of their employees out for at least some period of time. It is striking that over 90 percent of all the employees in the transportation and public utilities sector were out of work in the smaller firms having less than 20 employees.

Table 17

Employees Out of Work First Week

Sector	Total	Establishments by employment size 0-19	20-99	100-249	250
Agriculture, etc.	248	97	107	44	0
Mining	0	0	0	0	0
Construction	4,069	2,380	1,495	194	0
Trans. & Pub. Util.	4,811	3,058	573	425	755
Wholesale Trade	2,832	782	604	732	714
Retail Trade	12,623	4,440	5,403	1,979	801
Finance, etc.	2,770	808	633	91	1,238
Services	15,333	7,930	3,308	1,405	2,690
TOTAL	42,686	19,495	12,123	4,870	6,198
		Percent of employees [1/]			
Agriculture, etc.	8.6	8.6	8.6	8.6	0
Mining	0	0	0	0	0
Construction	17.1	20.6	17.2	6.7	0
Trans. & Pub. Util.	17.9	90.6	8.9	7.4	6.7
Wholesale Trade	11.1	10.0	5.8	17.3	24.2
Retail Trade	13.8	16.8	16.5	14.2	4.3
Finance, etc.	12.8	17.0	12.8	2.1	16.2
Services	20.9	33.9	17.5	12.9	13.5
TOTAL	16.0	24.8	14.5	11.4	10.1

[1/] Percent of all employees by sector in the six county TMI area as of December, 1978.

Source: Department of Commerce, Bureau of Statistics, Research and Planning.

Supply and Marketing Disruptions - During the TMI incident, there was some disruption of nonmanufacturing entities' supply and marketing channels for products purchased or products sold. The Department of Commerce's study of the impacts of TMI found that, at the time of the accident, five percent of the nonmanufacturing entities had disruptions in supply of products purchased and about 12 percent had disruptions in channels for products sold.

This is remarkably close to the disruption patterns experienced in the manufacturing sector. In both manufacturing and nonmanufacturing only a relatively small share of the total establishments/entities were disrupted, and the disruption in marketing was the more pronounced. In fact, the share of the establishments experiencing marketing disruptions was nearly identical in both cases.

Table 18 displays the distribution of dislocations among the smaller and larger firms according to the eight nonmanufacturing sectors. It is significant that contrary to the situation which occurred in manufacturing, it was the larger nonmanufacturing entities which experienced the greatest share of the disruptions, both in supply and in marketing. Because of the dominance of smaller firms in nonmanufacturing, it is not surprising that most of the actual number of disruptions occurred among these firms. However, when the entities are classified as either smaller or larger, then it can be seen that the share of the entities disrupted is greater among larger firms.

The basic causes for disruption at the time of the accident for nonmanufacturing were probably the same as those causing disruption in manufacturing - ie., during the crisis period thousands of persons evacuated the area, some retail stores (including food outlets) and service establishments closed for a period of time. Simultaneously, a Teamsters strike occurred. For instance, the data collected by Commerce in May, 1979 concerning TMI impacts on 16 selected warehousing and distribution firms (part of the transportation and public utilities sector) revealed that about one-third of the establishments experienced some form of disruption attributable to TMI in either supply or delivery of products - and, for some of these firms, the truckers strike was even more disruptive than TMI.

Retail trade, wholesale trade, and services entities account for 92 percent of those experiencing dislocations in supply and over 98 percent of the marketing distributions. This indicates that the disruptions are linked to the decline in the number of consumers (resulting from the voluntary evacuation or consumer resistance among those who remained) as well as transportation interruptions in the flow of commodities purchased or sold, or services rendered.

Table 18

Nonmanufacturing Dislocation

Sector	Total Entities: Disrupted Entities	Total Entities: % of Entities	Less than 20 Employees: Disrupted Entities	Less than 20 Employees: % of Entities	More than 20 Employees: Disrupted Entities	More than 20 Employees: % of Entities
Disruption in Receiving Supply of Products						
Agriculture, etc.	0	0	0	0	0	
Mining	12	46.2	5	45.5	7	46.7
Construction	13	0.4	0	0	13	5.0
Trans. & Public Utilities	38	4.5	0	0	38	17.9
Wholesale Trade	116	7.2	100	7.7	16	5.4
Retail Trade	450	7.3	266	5.1	184	18.9
Finance, etc.	13	0.9	0	0	13	8.3
Services	364	5.6	332	5.6	32	5.5
TOTAL	1,006	5.0	703	4.0	303	12.0
Disruption in Marketing Products						
Agriculture, etc.	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Construction	0	0	0	0	0	0
Trans. & Public Utilities	26	3.1	0	0	26	12.3
Wholesale Trade	571	35.6	502	38.4	69	23.2
Retail Trade	1,225	19.9	930	17.9	295	30.2
Finance, etc.	12	0.8	0	0	12	7.7
Services	565	8.6	498	8.3	67	11.5
TOTAL	2,399	11.9	1,930	10.9	469	18.5

Source: Department of Commerce, Bureau of Statistics, Research and Planning.

Value of Business Lost - The estimated total value of business or sales losses during the immediate period of the TMI incident was just over $74 million for the entire nonmanufacturing activity in the six county area. The average loss per entity was $3,673. (This average value represents the losses sustained in each sector where there were reported losses by size group of entities.) The value of business lost during the first week is shown in Table 19 which follows on the next page.

Overall, the largest business losses were experienced by the retail trade, wholesale trade, and the finance, insurance and real estate sectors. Over 85 percent of the lost business occurred in these three sectors; and retail trade alone accounted for 53 percent of the total loss.

Average loss per entity was highest for finance, insurance, and real estate, followed (in order) by wholesale trade and retail trade. The largest losses were found in entities having more than 20 employees (i.e., the larger firms). This should not be surprising, since the larger firms do the greatest volume of business, even though they comprise the minority of the number of total firms. The average value of lost business in the larger firms was nine times that of the smaller firms , while total employment in these firms was only 2.4 times that of the smaller ones. Wholesale and retail trade had remarkably similar losses per entity regardless of size of firm, even though the total losses in wholesale trade were one-third that of retail trade

Short Term Impacts

The Pennsylvania Commerce Department's nonmanufacturing study also evaluated the TMI impacts after the first week crisis period ended.

The Department of Commerce found that of the 401 entities heard from, 199 (nearly 50 percent) expressed the opinion that their business had been interrupted due to TMI and that their business activity was not at normal levels during the time of the crisis. And, by April 9, 1979 - when the Governor's advisories were rescinded - 86 entities (about 43 percent) were still not back to normal business activity. By contrast, the manufacturing study showed that most manufacturing plants had returned to normal production by April 4th, and the remaining soon thereafter. By the end of April, however, the majority of nonmanufacturing firms had returned to normal business levels and by the end of May, only 19 out of the 199 which had indicated interruptions had not returned to normal business activity.

Table 19

Value of Business Lost

Sector	Total million $	Average per Entity[1/]	Less than 20 Employee million $	Average per entity	More than 20 employees million $	Average per entity
Agriculture,etc.	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Construction	2.815	880	1.096	373	1.718	6,687
Trans. & Public Utilities[2/]	1.213	1,449	0	0	1.213	5,719
Wholesale Trade	11.050	6,889	4.941	3,783	6.109	20,499
Retail Trade	39.115	6,352	19.767	3,814	19.348	19,824
Finance,etc.[3/]	13.154	8,775	2.725	2,029	10.428	66,848
Services	6.842	1,043	2.846	476	3.996	6,855
TOTAL	74.188	$3,736	31.376	$1,873	42.812	$17,249

1/ Value of business lost in universe divided by 12/78 employment in entities by size groups for sectors having losses.

2/ The transportation and public utilities sector does not include data for Metropolitan Edison which is a unique case, nor for an airline with a comparatively large loss whose response arrived after estimates had been completed.

3/ One financial institution in the 20-99 employment size group reported an extraordinarily large business loss of $500,000. Although the $500,000 loss was included in the extrapolations, the remainder of the 20-99 size group was inflated by an average of the 0-19 and 100-299 employee size group instead of the 20-99 size group.

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning.

It is difficult to isolate TMI impacts from all other economic factors which may have been the cause of this finding. Maybe there were some problems still associated with TMI, but there were many other cogent factors also at work. April began a quarter of general decline and a sluggish economy. In such a climate, both nonmanufacturing and manufacturing activities can be expected to experience problems.

Business Levels - The data gathering effort conducted by the Commerce Department in September, 1979, concerning the nonmanufacturing firms did not produce data documenting man hours lost, wages lost, or value of business lost due to TMI for the time beyond the immediate impact period of the incident. Rather, it showed that such dollar losses "since then" were either none or were not known.

At the time of the September study, nearly 23 percent (4,560) of the total entities in the universe had business levels below normal, while 72 percent considered their business levels to be normal. Of the total entities which believed that their business levels were below normal, more than one half (52 percent) were in the retail trade sector and about 28 percent were engaged in providing services. So a total of 80 percent of the entities having business below normal by September were in these two sectors. See Table 20.

Viewed from the aspect of the individual sectors, however, over 38 percent of all entities in the retail trade sector felt their business to be below normal and an estimated 26 percent of the wholesale trade entities and nearly 24 percent of the transportation and public utilities entities believed their business was below normal levels.

Table 20

Nonmanufacturing Sectors with Below Normal Business
September, 1979

Sector	Number of Entities	% of all Entities
Agriculture, etc.	0	0
Mining	0	0
Construction	58	1.8
Transportation & Public Utilities	199	23.8
Wholesale Trade	421	26.2
Retail Trade	2,367	38.4
Finance, etc.	240	16.0
Services	1,275	19.4
TOTAL	4,560	22.6

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning

It should be reiterated here that about 10 percent of the firms which responded that their business had been interrupted due to TMI (19 out of the 199 interrupted) had not returned to normal business activity by the end of May, 1979. After May, however, most of the remaining responding firms gradually returned to normal activity from the effects of TMI so that, by September 1, 1979, only nine entities (about five percent of the 199) had not yet regained normal levels of business (and one of these was experiencing a strike). This would indicate that the effects of business interruption due to TMI had all but disappeared by September 1, 1979, and factors other than TMI must have been influencing the economy.

Working Hours - The Department's study in September found that an estimated 88 percent of all nonmanufacturing entities had average weekly working hours at normal levels. While almost nine percent had weekly working hours below normal. A higher percentage occurred in the transportation and public utilities sector. There an estimated 33 percent of the entities experienced below normal average working hours. This could be linked to the fact that about 24 percent of the entities in this sector felt that their business levels were below normal. In this sector, more than the others, the declines in business appear to have affected the amount of hours worked. Other sectors reporting a high degree of below normal working hours are services (about 11 percent) and retail trade (about 10 percent).

Image Problems - By September 1979, less than five percent of the universe of nonmanufacturing entities noted any short term image effect from TMI on their product. Only in the wholesale trade sector did the image problem appear to be noteworthy. Wholesale trade mainly includes the distribution and sale of both durable and nondurable goods to retailers and trading establishments. Therefore, declines in retail businesses can adversely affect wholesale trade. So, while image problems may have been felt by the entities, in all likelihood the explanation lies in the lessening of business activity and consumer demand brought about by a sluggish economy as it affected retail establishments. Further evidence of this may be seen in the fact that only a little over two percent of the retail trade entities felt they were experiencing any TMI image problems, but over 38 percent of the retail trade firms thought that their levels of business were below normal.

Most nonmanufacturing establishments could not provide a dollar value for the short term image effects. Over 96 percent of the firms responding felt that the TMI incident would not have any long term image effect on their business activity.

When comparing the opinions concerning the severity of the "image problem" between manufacturing and nonmanufacturing firms, there would appear to be a lessening of concern about image occurring in the business community over time. For example, in May, 1979, the manufacturing firms analyzed by the Commerce Department indicated that only about 10 percent of the total (112 out of 1,141 firms) believed that their product had an "image problem" due to the accident. While it is recognized that manufacturing is different from nonmanufacturing, nevertheless business leadership attitudes concerning the incident would probably be similar. Thus, since less than five percent of the nonmanufacturing firms reported image problems in September, this probably reflects an improvement over the perceived condition in May.

Employment Changes - An examination of comparative employment trends from the time of the accident through September was undertaken to determine TMI's significance. This study compares employment trends in the Harrisburg, York, Lancaster and Lebanon labor market areas (a seven county area surrounding the plant) by six sectors of nonmanufacturing (including government) in order to determine whether the trends in 1979 were similar to those in 1978. The purpose was to weigh the 1979 trends against the sectorial changes as they occurred in 1978, and to relate the results of the Department of Commerce's study showing the aforementioned short term effects to employment trends which have occurred since March.

Table 21 shows employment changes by nonmanufacturing sector for the period March through September for both 1979 and 1978. It should be noted that the March 1979 total nonmanufacturing employment was 369,000, roughly 14,000 jobs higher than the previous March of 1978. Between March and September, 1979, nonmanufacturing employment grew by about 4,000 jobs (or just about one percent) compared to a growth of 20,000 jobs (roughly six percent) in 1978 over the same period. What this shows is that the nonmanufacturing economy from March through September in 1979, has not had as significant growth as in 1978. More importantly, the wholesale and retail trade sectors, which felt much of the brunt of TMI in the immediate period of the accident, have shown no overall growth in employment. Table 21 reveals that between March and June of 1979, total nonmanufacturing employment grew by 8,000 jobs, with wholesale and retail trade accounting for almost 2,000 of these jobs. What happened then is that from June onward, a gradual decline in nonmanufacturing employment set in cancelling out over one-half of the employment gained. Wholesale and retail trade lost all of the employment increases which were gained between March and June. So irrespective of TMI, there were employment gains in all sectors of nonmanufacturing except government in the three months immediately following the accident.

Table 21

Employment[1/] Changes By Nonmanufacturing Sector[2/]
By End of Quarter Month, 1978 and 1979

Sector	March	June	March-June Absolute Change	March-June % Change	Sept.[3/]	March-September Absolute Change	March-September % Change
1979							
Contract Construction	22.9	25.3	+2.4	+10.5	25.6	+2.7	+11.8
Trans. & Public Utilities	30.6	31.4	+0.8	+2.6	31.1	+0.5	+1.6
Wholesale & Retail Trade	116.4	118.2	+1.8	+1.5	116.4	0	0
Finance, Insurance and Real Estate	22.4	22.7	+0.3	+1.3	22.7	+0.3	+1.3
Government	97.1	96.8	-0.3	-0.3	94.4	-2.7	-2.8
Other Nonmanufacturing	80.0	83.0	+3.0	+3.7	83.1	+3.1	+3.9
TOTAL	369.4	377.4	+8.0	+2.2	373.3	+3.9	+1.1
1978							
Contract Construction	20.1	27.3	+7.2	+35.8	28.4	+8.3	+41.3
Transp. & Public Utilities	29.4	31.5	+2.1	+7.1	31.6	+2.2	+7.5
Wholesale & Retail Trade	108.0	117.5	+9.5	+8.8	116.4	+8.4	+7.8
Finance, Insurance and Real Estate	20.6	22.0	+1.4	+6.8	22.1	+1.5	+7.3
Government	96.7	99.0	+2.3	+2.4	94.7	-2.0	-2.1
Other Nonmanufacturing	80.9	82.8	+1.9	+2.3	81.9	+1.0	+1.2
TOTAL	355.7	380.1	+24.4	+6.9	375.6	+19.9	+5.6

1/ Employment in thousands and not seasonally adjusted.

2/ Includes Harrisburg, York, Lancaster and Lebanon labor market areas.

3/ Preliminary figures.

Source: Pennsylvania Department of Labor and Industry, Office of Employment Security

Table 22 shows percent changes in employment in nonmanufacturing month by month since March for 1979 and 1978. It shows that during April, (first month after the accident) employment was nearly one percent higher than that in March - and wholesale and retail trade were doing even better (a gain of 1.5 percent). These gains in nonmanufacturing employment during the month of April and throughout the period up through June would indicate that TMI had no significant adverse affects on nonmanufacturing employment.

The above statement recognizes that 1979 was not as good a year as 1978, but this is probably not a result of TMI, but rather due to adverse economic factors at work throughout the nation and the State. These include inflation, rising interest rates, the dampening effects of OPEC price increases and the lessening of available capital for investment. 1978 was a relative "banner year" when compared to 1979, at least in total employment gains.

After June, the cumulative effects of the slowly worsening economy began to "settle in" so that there have been few nonmanufacturing sectors gaining any significant employment. Except for construction and other nonmanufacturing (which includes services), all other sectors exhibited stagnation or losses. Even though total nonmanufacturing employment levels were substantially higher in March of this year when compared with March of last year, by June and September total employment had fallen below the totals for the same months of 1978.

Finally, when comparing the seven county TMI area with the Commonwealth and the nation, (see Table 23), it becomes evident that Pennsylvania and the TMI area have not been doing as well as the nation as a whole. The March to June period in 1978 showed Pennsylvania and the TMI region to be ahead of the nation, but during the period June to September 1978, the State and the region began to fall behind the growth in nonmanufacturing experienced in the nation as a whole.

For the same six-month period in 1979, the State and the TMI region have remained below the national nonmanufacturing rate of employment growth gains. However, it is very important to note that the seven county TMI area has been doing better than the State as a whole since June (i.e., its declines have not been as great).

Table 22

Nonmanufacturing Employment Comparisons, 1978 and 19791/

Percent Changes

Sector	March/April Change	April/May Change	May/June Change	June/July Change	July/Aug. Change	Aug./Sept. Change
1979						
Contract Construction	+3.1	+4.7	+2.4	+2.8	-0.4	-1.2
Transp. & Public Utilities	+1.0	+0.3	+1.3	-0.6	+0.3	-0.6
Wholesale & Retail Trade	+1.5	0	0	-0.6	-0.2	-0.8
Finance, Insurance and Real Estate	0	-0.4	+1.8	-0.4	+0.4	0
Government	+0.3	+1.0	-1.6	-3.3	-0.3	+1.2
Other Nonmanufact.	+0.2	+1.7	+1.7	-0.2	+0.2	+0.1
TOTAL	+0.8	+1.0	+0.3	-1.0	0 (-0.05)	0 (-0.05)
1978						
Contract Construction	+14.4	+13.5	+4.6	+2.9	+2.5	-1.4
Transp. & Public Utilities	+1.4	+6.0	-0.3	-0.3	0	+0.6
Wholesale & Retail Trade	+1.0	+6.8	+0.9	-0.3	-0.3	-0.3
Finance, Insurance & Real Estate	+1.9	+3.3	+1.4	0	+0.9	-0.5
Government	+0.1	+2.6	-0.3	-4.7	-0.5	+1.0
Other Nonmanufact.	+1.1	-0.6	+1.8	-0.5	0	-0.6
TOTAL	+1.6	+4.1	+1.0	-1.3	0 (+0.03)	0 (+0.05)

1/ Includes Harrisburg, York, Lancaster and Lebanon labor market areas.

2/ September figures are preliminary.

Source: Pennsylvania Department of Labor and Industry, Office of Employment Security.

Table 23

Nonmanufacturing Employment Trend Comparisons
U.S., Pa. and Seven County TMI Area

Area	March-June % change 1978	March-June % change 1979	June-Sept. % change 1978	June-Sept. % change 1979
U.S.	3.8	2.9	+0.5	+0.7
Pa.	4.6	2.3	-1.3	-1.6
7 county TMI area	6.9	2.2	-1.2	-1.1

Source: Pennsylvania Department of Labor and Industry, Office of Employment Security.

This story of declining employment trends in nonmanufacturing in all likelihood explains why some nonmanufacturing entities were finding themselves "below normal since TMI" (23 percent of the entities), or felt they were experiencing "image problems" (five percent of the entities), or had "below average weekly working hours" (nine percent of the entities) by September, 1979 - six months after the TMI accident.

It should be pointed out that most nonmanufacturing firms were at "normal levels" by September. Given the state of the national economy, it is a credit to the stability of the region's economy, that the TMI region is doing as well as it is. Some firms in September were even at "above normal" business levels (six percent of the entities), and some were having above normal weekly working hours (3 percent of the entities).

Small Business Effects

On April 18, 1979, Governor Dick Thornburgh requested the Small Business Administration to declare an economic disaster area in southcentral Pennsylvania counties affected by the Three Mile Island incident. His request was made in order to entitle area merchants, farmers and businessmen who sustained economic losses as a result of the incident to receive SBA loans at significantly reduced rates, as well as certain forms of economic and technical assistance.

Governor Thornburgh noted that economic hardships had been brought about by the incident and the precautionary measures it necessitated - including the limited evacuation of pregnant women and young children and the placement of Civil Defense forces on alert status. As a result, he recognized that normal business activity had been disrupted and firms had experienced millions of dollars in losses. He believed that these businesses qualified for the economic injury assistance which SBA can provide.

An assessment of the impacts on small businesses was developed via an examination of the number of applications for business loans from the Small Business Administration. In the beginning of May, SBA established temporary offices to receive applications for loans in Harrisburg, York, and Lancaster. Later in May an office was set up in Middletown.

The SBA loans must be for economic injuries suffered because of the TMI incident. Proof of the injury must be furnished with the loan application. Loans can only be provided for the losses not recoverable through normal commercial channels, or internal resources. The SBA will accept TMI related applications until January 28, 1980. Loans up to $100,000 can be made available at an interest rate of 7 3/8 percent annually for a period of up to 30 years. The actual repayment period can be shorter and is determined by an applicant's ability to repay the loan.

As of November 15, 1979, SBA had conducted over 475 interviews with potential applicants to explore eligibility. As a result, 64 applications have been accepted. The dollar amount associated with these eligible applications was nearly $3.3 million. Most accepted applications were from retail establishments and the main cause of the loss due to TMI was the drop in sales prior to Easter. Another group affected were realtors which experienced a slight downturn in activity following the accident. Thus far, 22 applications have been approved for loans amounting to $510,000 and 31 applications have been declined by SBA. Ten applications were still being processed by mid-November. One application for $12,000 has been withdrawn.

Because of the nature of the SBA program and its eligibility requirements for borrowing money, those firms which had experienced financial trouble prior to the TMI incident were rejected because they could not establish that their problem was due to TMI alone. Also, establishments which can easily obtain credit through normal commercial financial channels or which can absorb the losses with their existing resources are not reflected in the figures above, because they would be ineligible.

Many members of the business community did not apply to the federal government for help. Since the closing date for the program is not until the end of January, it could be anticipated that many business owners are waiting until the end of this calendar year to assess their financial condition before deciding whether or not to apply for a loan.

At the present time only the Harrisburg office remains open; the Middletown office closed in mid-June and the Lancaster and York offices closed in mid-August due to lack of activity. Most of the interest in the SBA program was shown in May and June.

Nonmanufacturing Unemployment Compensation Claims - The description of the unemployment claims filed as a result of TMI has been well covered in the section on manufacturing. The information indicated that 239 of the total initial claims (one-third of the total) occurred in nonmanufacturing sectors. Of the continued claims - 1,032 or almost 70 percent of the total also are in nonmanufacturing. The majority of the nonmanufacturing claims are in the construction sector.

APPENDIX A

STANDARD INDUSTRIAL CLASSIFICATION
DIVISIONS BY 2-DIGIT BREAKDOWN

Division A. Agriculture, Forestry and Fishing

01 Agricultural Production - Crops
02 Agricultural Production - Livestock
07 Agricultural Services
08 Forestry
09 Fishing, Hunting and Trapping

Division B. Mining

10 Metal Mining
11 Anthracite Mining
12 Bituminous Coal and Lignite Mining
13 Oil and Gas Extraction
14 Mining and Quarrying of Nonmetallic Minerals, Except Fuels

Division C. Construction

15 Building Construction - General Contractors and Operative Builders
16 Construction Other Than Building Construction - General Contractors
17 Construction - Special Trade Contractors

Division D. Manufacturing (20-39)

Division E. Transportation and Public Utilities

40 Railroad Transportation
41 Local and Suburban Transit and Interurban Highway Passenger Transportation
42 Motor Freight Transportation and Warehousing
43 U.S. Postal Service
44 Water Transportation
45 Transportation by Air
46 Pipe Lines, Except Natural Gas
47 Transportation Services
48 Communication
49 Electric, Gas, and Sanitary Services

Division F. Wholesale Trade

50 Wholesale Trade - Durable Goods
51 Wholesale Trade - Nondurable Goods

Division G. Retail Trade

52 Building Materials, Hardware, Garden Supply, and Mobile Home Dealers
53 General Merchandise Stores
54 Food Stores
55 Automotive Dealers and Gasoline Service Stations
56 Apparel and Accessory Stores
57 Furniture, Home Furnishings, and Equipment Stores
58 Eating and Drinking Places
59 Miscellaneous Retail

Disivion H. Finance, Insurance, and Real Estate

60 Banking
61 Credit Agencies Other Than Banks
62 Security and Commodity Brokers, Dealers, Exchanges and Services
63 Insurance
64 Insurance Agents, Brokers, and Service
65 Real Estate
66 Combinations of Real Estate, Insurance, Loans, Law Offices
67 Holding and Other Investment Offices

Division I. Services

70 Hotels, Rooming Houses, Camps, and Other Lodging Places
72 Personal Services
73 Business Services
75 Automotive Repair, Services, and Garages
76 Miscellaneous Repair Services
78 Motion Pictures
79 Amusement and Recreation Services, Except Motion Pictures
80 Health Services
81 Legal Services
82 Educational Services
83 Social Services
84 Museums, Art Galleries, Botanical and Zoological Gardens
85 Membership Organizations
88 Private Households
89 Miscellaneous Services

Source: Standard Industrial Classification Manual, Executive Office of the President, Office of Management and Budget, Statistical Policy Division, 1972

Tourism

Pennsylvania's tourism business is one of the state's largest industries. It is the generator of 180,000 jobs and nearly $300 million in state tax revenues, based upon total annual traveler expenditures of about $4.7 billion a year. Visitors usually spend about $600 million a year touring in south-central Pennsylvania alone.

The tourist industry was directly affected by the TMI incident -- businesses and employees were both impacted. Events which followed soon after the TMI incident created additional hardships for the industry. The Amish polio scare in May, the gasoline shortage which started in Pennsylvania in June, and the slowly worsening condition of the national economy as reflected in rising unemployment and increasing inflation are major contributors to the decline in tourism. Because of this, it is difficult to separate the individual impacts on tourism created by each of these events; nor is it easy to accurately measure the extent to which tourism has recovered from TMI, or to diagnose what the exact long term effects of TMI on tourism will be. In any case, because of the early recognition of adverse TMI impacts, the federal Economic Development Administration in the U.S. Department of Commerce has awarded a $50,000 grant to the Pennsylvania Department of Commerce for a tourist advertising effort to overcome this problem.

Impacts on Convention and Commercial Activity

Immediate Impacts - In the 30 day period following the incident at TMI, a small sample of tourist-related businesses within a six county area surrounding the plant was contacted by the Bureau of Travel Development in the Pennsylvania Department of Commerce for the purpose of identifying the immediate short-term losses incurred as a result of the crisis. Lancaster, Harrisburg and Gettysburg were used as study areas. Information was obtained from ten major lodging and convention sites employing an average 2,625 persons; it indicated that initial sales losses of nearly $2 million were directly attributable to TMI. Such losses included the cancellation of the National Hardware Dealers' spring convention at the Pennsylvania Farm Show Building in Harrisburg -- resulting in an estimated loss of $500,000 in receipts to the area's businesses. This particular convention loss resulted in the cancellation of reservations of 2,300 rooms in major lodging establishments in and around the Harrisburg area, and there were other conference and reservation cancellations at the time of TMI as well.

Overall, motel/hotel occupancy rates dipped drastically because a number of conferences and conventions scheduled for the month of April were cancelled. While hotel/motel reservations suffered because of the decline in convention and conference business, there were some lodging accommodations which profited, with April business being above normal. They were those which hosted the hundreds of reporters, engineers, medical personnel and others who were responding to the accident.

Based upon the $2.0 million in lost sales revenues experienced by the ten major lodging and convention sites, the Department extrapolated the data to reflect the estimated sales losses in the six county area around TMI. The estimated immediate short term loss is on the order of $5 million. This calculation utilized an average sales loss of $762 associated with each employee in the sample and the 1976 employment in all 244 lodging and convention establishments in the six county area (6,240) around TMI.

The estimated $5 million in immediate short term losses does not represent the total which was sustained by the tourism community. The figure would certainly be higher if additional establishments such as independent restaurants, service stations, and entertainment sites were to be considered. Nor does it include wage losses of employees in the tourism industry -- some tourist businesses made cutbacks in employment in order to offset their losses of income.

Short-Term Impacts

In early November, the Department of Commerce conducted a follow-up survey of the same areas. Results from the second survey indicate continued losses, with most businesses attributing the decline to spring and summer gasoline shortages.

Harrisburg experienced the greatest loss. Bus tour bookings for 1980 were ahead of last year in the Lancaster area, but were below normal in Harrisburg. TMI was not considered a significant factor for declining business in Gettysburg.

Lancaster - Lancaster area business losses attributed to TMI lasted approximately three to four weeks. As the tourist season progressed, other factors including a small outbreak of polio among the Amish and the gasoline crunch contributed to the decline. Area businesses ranked TMI third among the three factors considered responsible for the decrease. At the time of the survey, however, bus tour bookings for 1980 were well ahead of last year.

Harrisburg - Harrisburg area businesses experienced severe and immediate short term losses. As the summer progressed, the percentage of decline decreased indicating possible image improvement for the area. Most area businesses assigned the major portion of their losses to the gasoline shortage even though the immediate losses resulting from the accident were severe enough to be considered major for Harrisburg.

So far, 1980 bus tour bookings are slightly below normal, and may reflect the apprehension of potential visitors because of the area's close proximity to TMI.

Somewhat unique to the situation was the concern of this area's business managers and owners that TMI "won't go away". Recurring or new problems at the nuclear site are considered to be very newsworthy, and thus unwelcomed by the business community. These same private sector entrepreneurs remain skeptical about the value of TMI as a new tourist attraction.

Gettysburg - Gettysburg tourism losses attributed to the accident were not considered significant by area businesses. Only during the two weeks following the incident was TMI considered responsible for any losses. The distance separating Gettysburg from TMI is probably a strong contributing factor to this finding. Area businesses in the sample concurred in blaming the gasoline crisis for tourist season losses.

Tourist Travel Plans - Several weeks after the TMI incident, private sector hoteliers, restaurateurs, and other travel industry members sponsored a research study to determine the existing and projected effects of the TMI incident on tourism. A consultant was retained by the tourist industry to determine the longer term impact of TMI on travel plans.

The study was conducted in late April through the use of a telephone inquiry of six geographic areas in and around Pennsylvania. This survey, it is important to note, was carried out prior to the emergence of other factors (the polio outbreak, the gasoline shortage, economic downturn, etc.) which later had a great bearing on tourism during the summer season. A total of 608 interviews were conducted in the following areas:

Allentown/Reading/Scranton/Wilkes-Barre
Baltimore
Cleveland
Long Island (New York)
Northern New Jersey
Philadelphia/Wilmington

Those questioned were household heads who intended to travel by car or bus during the succeeding six months, and who would bring along one or more pre-teen children on the trip. The study found that 98 percent of all the respondents were aware of the TMI incident, therefore, their decision to travel to Pennsylvania could have been heavily influenced by the TMI event.

Impacts on Travel Plans - The study found that two percent of all households queried would avoid traveling to Pennsylvania by car or bus because of concerns relating to TMI, nuclear power, nuclear plants, radiation, and fallout. The seven selected travel destinations are listed below, along with the percentage of households which indicated they would avoid these areas.

Gettysburg	Less than 1%
Harrisburg	6%
Hershey	1%
Lancaster/Dutch Country	1%
Poconos	Less than 1%
Philadelphia	Less than 1%
Pittsburgh	Less than 1%

It is obvious that Harrisburg and its association with nearby TMI was the only selected area where a notable share of the respondents did not want to visit. But of equal interest is the fact that only approximately one percent of the family travelers would avoid the other six selected areas -- hence the share which would have avoided these destinations was less than the share which indicated they would avoid traveling to the state as a whole.

Because of the national news coverage, the TMI incident received, it is remarkable that such a small percentage of the family travelers' plans were found to be negatively affected. Nevertheless, during the summer the experience of the tourist industry led it to believe that TMI did have a continuing impact on tourism, even though it is felt that other factors have played a more dominant role in creating the general tourism malaise. For example, findings in mid-August indicate that tourism in Lancaster County was off 50 percent this year (off $150 million), partly because of the nuclear accident.[1/]

[1/] Testimony of James R. Bartlett, Executive Director of the Pennsylvania Dutch Visitors Bureau, before the House Select Committee Investigating Three Mile Island, August 22, 1979.

Visitor Center Totals - The Department of Commerce cooperates with local travel agencies across the Commonwealth in the maintenance of visitor information centers. A log of visitors to these centers is maintained and is forwarded to the Bureau of Travel Development on a monthly basis. Information on the total number of visitors recorded at visitor information centers in the 20 mile radius (Cumberland and York centers), as well as those recorded at centers in the rest of the state, is shown in Table 24 on the following page. This data indicates that the number of visitors at these centers and in the rest of the state has been declining since April when compared with the previous year. The rate of decline increased from April through July but improved during August and September. The decline in visitors at the Cumberland and York centers was steeper than in the rest of the state during May through August but less than the state decline in September. The steeper decline may have reflected the effects of TMI and the polio outbreak -- two experiences which are relatively unique to this area. But after the summer months, this effect seems to have abated.

Commonwealth Media Campaign - To combat the economic losses incurred or anticipated by the travel industry as a result of TMI, the Department of Commerce will undertake a media advertising campaign in the spring of 1980, before the actual travel season begins. The campaign will attempt to counteract the negative publicity produced by the nuclear accident. It's thrust will be directed toward projecting an "all-clear" image for Pennsylvania. The advertising campaign is expected to assist in overcoming any long term effects of TMI which may harm Pennsylvania's image as a place to enjoy natural, man-made, ethnic, historical and cultural attractions for family visits and group meetings. An Economic Development Administration grant of $50,000 has been given to Pennsylvania to assist in conducting this campaign.

TMI as a Tourism Generator - Since the TMI incident created so much national publicity, the site of the plant has become an attraction of sorts for the tourist and the curious. The Metropolitan Edison Company since 1970 has maintained a visitors' center and observation facility adjacent to the plant which, before the incident, normally attracted an average of 16,000 people a year, mostly school groups and occasional passers-by. The largest daily attendance prior to the incident was 350 visitors.

As a result of the crisis, the center was closed during April, May and June. It reopened July 7, 1979, with a 19 minute video tape produced by the utility explaining the accident and radiation emitted. On the first day, 1,200 visitors came to the center. The second day 900 visitors arrived. Since reopening, the center has been operating six days a week, and visited by an average of 2,347 persons per

Table 24

Visitor Center Activities

Year	Month	Cumberland and York Centers Number of Visitors 1978 - 1979 Season	Cumberland and York Centers Number of Visitors 1979 - 1980 Season	Cumberland and York Centers % Change	Rest of State Numbers of Visitors 1978 - 1979 Season	Rest of State Number of Visitors 1979 - 1980 Season	Rest of State % Change
1978	April	8,689	8,175	- 5.9	26,496	24,804	- 6.4
	May	8,897	6,783	-23.8	32,157	25,872	-19.5
	June	11,301	7,611	-32.7	46,937	34,193	-27.2
	July	15,750	9,171	-41.8	68,103	40,113	-41.1
	August	15,065	11,060	-26.6	63,157	48,542	-23.1
	September	8,597	7,518	-12.5	42,421	33,453	-21.1
	October	9,046			36,411		
	November	6,029			22,873		
	December	4,019			16,543		
1979	January	2,856			13,095		
	February	3,201			11,684		
	March	6,827			19,155		

week. Average daily attendance is running higher than before the incident. Between July 7 and October 31 the center was visited by 38,718 people. This compares to a total of 14,000 for the entire year of 1978.

Because of the increased number of visitors to TMI, it is estimated that some tourist dollars are flowing into the area as a result of the accident, which may tend to offset some of the losses suffered during the tourist season. However, as indicated previously, Harrisburg area businesses are skeptical about the value of TMI as a tourist attraction.

IMPACTS ON HOUSING AND PROPERTY VALUES

Findings

The Three Mile Island accident had a noticeable effect on the real estate market within a five mile radius surrounding the plant in the months immediately following the accident. This effect diminishes with distance from the plant site, and the latest available data indicates that the impact may be dissipating.

According to a study done of the Pennsylvania Department of Community Affairs, the major impacts of TMI are a decreased number of homes sold, and a longer selling period for homes on the market within the five mile radius. Data for these two factors, when compared to data for the corresponding months in 1978, reveals substantial differences. These impacts may be short term, since housing market data for the third quarter of 1979, appears to be more encouraging. An added indicator of the impact of TMI is that the effect statistically diminishes outside of the 5 mile radius. Although housing sale price seems somewhat depressed, this does not in itself comprise as substantial an impact as the number of houses sold and days on the market. Here again, the five mile radius exhibits the deepest deflation, yet appears to recover in August. Realtors noted a few incidences of loss of sales due to TMI, but no panic selling. Property values were also influenced by other extenuating circumstances such as the relatively harsh winter-spring of 1978-79 and the uncertainty of mortgage funds. It is impossible to precisely identify where one impact ends and another begins in analyzing a universe as variable as the real estate market.

The DCA analysis was done on the basis of 5 mile concentric circles from the TMI plant site. By comparison, a second study done by the Pennsylvania Department of Revenue on an aggregated county by county basis, found no definitive effect of the TMI accident or property values. This analysis is explained in greater detail in the Impacts on Government chapter.

Within the new construction market, TMI and other constraints such as unavailable, or expensive mortgage money and high interest rates have had a depressing effect. Again, the greatest drop occurs in the 5 mile radius, decaying over distance from TMI, and recovering substantially by August. Builder expectations also reflects a residential building downturn focusing on the 0-5 mile ring, because of TMI. This may be a speculative appraisal, however. Construction employment was lower in Harrisburg compared to other areas, but many extraneous variables make a direct correlation with TMI difficult.

Continued monitoring and analysis of property value data over the coming months is necessary before a conclusion statement on the impact of TMI can be drawn with any confidence.

Study Design - To investigate the effect of the nuclear accident (TMI) on the real estate market, the Pennsylvania Department of Community Affairs recorded all residential real estate transactions by 5 mile concentric rings from Three Mile Island. The data came from two sources in order to cross check the findings: the Central Penn Multi-List, representative of many homes for sale in the TMI 20 mile radius; and the State Tax Equalization Board (STEB) Assessor's Office, covering all homes sold within the 20 mile radius of TMI. Data from Central Penn Multi-List, Inc. for the years 1977-1979 are available on a quarterly basis from the firm's Comparable Book. In this publication, residential properties settled in the prior quarter are listed by area and indicate time on the market, list price and sale price. In the third quarter of 1979, sales through the Multi-List service constituted 53 percent of all sales in the area described by a 5 mile radius from Three Mile Island. By and large, the larger firms are members. Thus, the Multi-List data represent a fair sample of real estate transactions, especially in the 5 mile radius.

The Central Penn Multi-List service also encompasses most of the area described by a 20 mile radius from TMI and thus, when we examine figures for the total Multi-List area, we are considering most of the geographic area surrounding TMI.

Number of Homes Sold - From the STEB data, the number of homes sold declined appreciably in a similar time period May-July, 1978 and 1979. A pattern can be noted in Table 25 as the degree of impact increased from May to July, and generally decreased with distance from TMI.

The data from the Central Penn Multi-List (information by quarters) do not show a decline from 1978 in the number of homes sold in the total 20 mile radius. However, the data does show a distinct decrease of homes sold in the 5 mile radius when compared to the second quarter of 1978. (See Table 27).

Residential Home Values - With respect to sale price, yearly appreciation values must be considered. The U.S. League of Savings and Loan Associations reports that between April 1978 and April 1979, the average price of existing housing in the Northeastern U.S. increased from $52,600 to $61,000, an increase of 16 percent. The average price of Central

Table 25

Residential Sales by Month

	MAY			JUNE			JULY		
	1978	1979	% Change	1978	1979	% Change	1978	1979	% Change
0-5 Mile Radius									
# Sales	42	28	-33	63	41	- 35	49	12	- 75
Average Value	32,599	34,154	4.8	35,526	34,694	- 2.3	34,532	35,587	3.1
5-10 Mile Radius									
# Sales	123	136	10.5	185	161	- 13	141	86	- 39
Average Value	37,927	44,640	17.7	44,988	47,438	5.4	42,291	46,985	11.1
10-15 Mile Radius									
# Sales	558	512	-8.2	679	614	-9.5	709	540	-23.8
Average Value	36,571	40,139	9.8	35,343	41,828	18.3	39,396	40,099	1.8
15-20 Mile Radius									
# Sales	249	210	-15.7	276	230	-16.7	235	185	-21.3
Average Value	34,450	44,857	30.2	36,482	41,328	13.3	34,957	40,645	16.3

Source: State Tax Equalization Board; Assessor's Office.

Pennsylvania houses is not as high as the base figure in 1978. It was $42,227 or approximately $10,000 less. For the quarter prior to the TMI accident, the increase of 1979 price over the 1978 price was only 0.8 percent. For the quarter subsequent to the TMI accident, the increase was 9.7 percent. The increase climbed to 12 percent in the third quarter of 1979. Therefore, though not performing at the level of the regional norm, both the STEB data and the Central Penn Multi-List data show increases in housing value from the previous year, 1978, for the total area.

The 5 mile radius, though, shows an actual drop in housing value in the June STEB data as can be seen in Table 25. The number of transactions in the 5 mile radius is relatively small, and a few low value transactions could have depressed the average value. However, the sluggish increases and some decrease are significant. A guarded interpretation (due to the small number of cases) is that the average value of residential real estate transactions in the 5 mile radius is less than might be expected subsequent to the TMI accident. This conclusion is reinforced by the fact that the housing values from 1978 to 1979 are less depressed with distance from TMI. In the third quarter of 1979, the increase over one year previous within the 5 mile radius was 19 percent, indicative of a possible upturn.

Figuring 30-60 days between a sales contract and closing, the TMI related effects are calculated to occur beginning in May, and carry through thereafter. As related above, there does appear to be negative effect in the 0-5 mile radius. Values appear to be slightly depressed in the 5-10 mile radius and 10-15 mile radius in that June and July values are less than 16 percent in Ring 2 and the July value is only 1.8 percent in Ring 3. Ring 4 showed healthy increases of 13.3 percent and 16.3 percent in June and July.

Real Estate Buyer Resistance - Following residential home values change, a second indicator of real estate buyer resistance in the TMI area is the number of days settled properties were on the market. With regard to days on the market for the total area, the average number of days on the market in the quarter following the accident was 82.7 and for the quarter one year previous the value was 81.6 (see previous summary table). There is no significant difference. The second quarter of 1979 shows a marked decrease in days on the market over the quarter previous. The third quarter is likewise lower than the second. There would appear to be no resistance to buying as indicated by this statistic when considering the total area (20 mile radius from TMI).

Table 27

Residential Sales by Quarters: Comparison 1978 to 1979

	Second Quarter			Third Quarter		
	1978	1979	% Change	1978	1979	% Change
Number Sold						
0-5 mile radius	64	53	- 17.2	41	48	17.1
Total 20 mile radius	1,020	1,075	5.4	1,165	1,140	- 2.1
Sold Price Average						
0-5 mile radius	38,460	38,735	0.7	34,012	40,686	19.6
Total 20 mile radius	42,751	46,903	9.7	44,114	49,573	12.4
Days on Market Average						
0-5 mile radius	71.0	93.4	31.5	65.5	59.6	- 9
Total 20 mile radius	81.6	82.7	+ 1.3	73.5	73.5	0

Source: Central Penn Multi-List, Inc.

For the 5 mile radius area, there is an appreciable difference in days on the market in the second quarter of 1979 as compared to the same quarter of 1978. Submitting the data to a "t" test, the difference is significant at the .10 level of significance. Thus, the data indicate some possibility of buyer resistance in the 5 mile radius area but the evidence is not overwhelming. Time on the market decreased in the third quarter which suggests than any effect was short-lived.

The Real Estate Industry Perspective - The realtor perception of residential sales is another indicator of buyer reaction. In July, the Department of Community Affairs queried 15 real estate agencies practicing in the area immediate to the plant (5 mile radius) about their experiences concerning the effects of the incident on the real estate market. Of particular interest was information on sales resistance, the occurrences of buyers backing out of contracts made prior to TMI, and any changes in the value of properties since the incident. The results of the study are shown on Table 28.

Table 28

Realtor Study Responses

Potential Impacts	Yes	No
Resistance to Sales	4	11
Buyers Backing Out of Contracts	3	12
Lower Property Values	1	14

Source: Pennsylvania Department of Community Affairs

As pertaining to sales resistance, only four realtors felt that there was some resistance as measured by their volume of business. Even for these, business had returned to normal by the month of May. Two reported that there was slight resistance within sight of the cooling towers. Buyers from out-of-town were more likely to be cautious about buying in the immediate area. In general, by the time of the study, real estate market activity seemed to be normal for that time of year. Any sluggishness of the market was attributed more to high interest rates and tightness of mortgage money than to the TMI incident.

The problem of buyers backing out of contracts because of the TMI incident was experienced by three realtors. One Middletown realtor reported this had happened up to eight times - the others reported that it occurred once or twice. From this preliminary reporting, at least some buyers had a concern about living in proximity to Three Mile Island.

Population Movement

There has not been any widespread outmigration from the area surrounding the Three Mile Island plant since the accident. Many individuals, however, have considered moving. A study by Mountain West Research found that 19 percent of persons surveyed in a 15 mile radius had considered moving because of the accident with 22 percent having definitely decided to move (4 percent of the total). Evacuees were three times more likely to have considered moving than non-evacuees. The Pennsylvania Department of Health in its census of all residents in the five mile radius found that 150 households had moved since the accident. In interviews with 55 of the 150, they found that 29% (16) had moved because of TMI. Elementary school enrollments in the five mile radius also fail to show any noticeable out-migration trend. So, while a significant proportion of the population surrounding TMI have considered moving due to the accident, only a very small percentage have actually relocated.

IMPACTS ON CONSTRUCTION INDUSTRY

Construction Employment

To analyze the effects of the TMI nuclear accident on the construction industry, data on contract construction employment were obtained from the Bureau of Employment Security of the Department of Labor and Industry. These data were analyzed by staff of the Department of Community Affairs. Data were obtained by month for 1978 and 1979 for the Harrisburg Labor Market Area (LMA) and those market areas of York, Lancaster and Lebanon. In total these areas constitute the seven county area of: Dauphin, Cumberland, Perry, York, Adams, Lebanon and Lancaster counties. Data were also obtained for comparison purposes from the Allentown-Bethlehem-Easton (ABE) area, an area outside the Three Mile Island area, and for the entire state of Pennsylvania. Table 29 shows percentage change by month in 1979 over employment in the same month one year previous.

The Harrisburg LMA shows declines in employment for all of 1979, compared with 1978, and these declines are most marked beginning in April, the start of the spring construction season. During this time, construction employment increased in actual numbers month by month, but the levels were not nearly what they had been one year previous. The state as a whole began showing declines also in April 1979, indicating something of a depression in the industry. The total seven county area also showed declines beginning in April, 1979. However, the declines in the Harrisburg LMA were most significant probably due to the end of Harristown construction described in more detail below. The Allentown-Bethlehem-Easton area also registered declines. Noting the data for the state and ABE, not all of the decline in Harrisburg can be attributed to purely local reasons.

It is quite likely that construction employment in Harrisburg was higher than usual in 1978 because of the Harristown project. That project was essentially completed by 1979. There was a significant increase in employment by May 1978 over March of that year - an increase of 2400 workers or about 50 percent. Beginning from a slightly smaller base in March 1979 (200 fewer), there was a more modest increase by May of 800 or 10.6 percent. For the state in the same period, the increase was 17.7 percent. For the period March-August 1979, Harrisburg increased by 14.7 percent and the state increased by 23.3 percent. Applying the state rate of increase to the Harrisburg area, the expected employment would be 9,248. The actual value in August for Harrisburg was 8,600. A difference of 648 might be attributed

to local effects. Although the rate of increase in construction employment in Harrisburg is not up to 1978 levels, factors other than TMI could well have caused the lowered rate. As a matter of fact, the monthly absolute construction employment figures increase modestly over the spring and summer months. Hence, TMI is a doubtful cause of sluggish construction employment.

New Residential Construction

The rate and scale of new construction activity is a major determination of the economic health of an area. It is sensitive to public perception of safety and vitality of any location. The construction of new units is a good indicator of the confidence of the population in living in the TMI area. Constructing a new home is a substantial investment requiring much time and thought concerning location choice. The impacts of TMI on new construction can be measured by an examination of local new construction permit data in permit issuing places. Also, the trend in construction beginning with April, 1979, can be reflective of the impact of the TMI incident.

New Construction Starts - The Pennsylvania Department of Community Affairs has examined new residential construction units in the 5, 10, 15 and 20 mile radii from TMI. It was felt that any impacts of the incident would be seen first and most keenly within communities located close to the plant. It should be remembered that in addition to whatever effects TMI may be having there are other serious economic factors which are certainly influencing new construction starts. Mortgage money, while available, now has interest rates well above 12 percent. In the U.S., residential construction costs are over 16 percent higher than last year. With talk of recession, people have become cautious in initiating contracts for new construction, and plans are being delayed in the hope that interest rates may come down. Housing starts this year, for example, are expected to decline nationally about 20 percent from 1978 levels.

As can be seen from data in Table 30, a substantial decrease in new construction activity occurred in April, May, June, July and August of 1979, from the same months in 1978. Although this decline could be the result of inflationary costs and mortgage money limiting new construction, there is a strong case for some TMI effect. The effect seems to decay over distance from TMI, and the greatest impact focuses on the 5 mile radius from TMI.

Table 29

Contract Construction Employment: 1979
(Data in thousands)

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG
Harrisburg SMSA	7.7	7.0	7.5	7.8	8.3	8.1	8.5	8.6
Lancaster SMSA	7.8	7.3	7.8	8.1	8.3	8.7	8.8	8.6
York SMSA	6.5	5.7	6.2	6.3	6.7	7.0	7.2	7.0
Lebanon Labor Market Area	1.2	1.2	1.4	1.4	1.4	1.5	1.5	1.5
Seven County Area	23.2	21.2	22.9	23.6	24.7	25.3	26.0	25.3
Allentown Bethlehem Easton SMSA	7.9	7.2	7.8	8.1	8.6	8.8	8.8	8.9
Pennsylvania	166.1	150.7	166.7	185.2	196.3	198.5	205.7	205.5

Percent Change in Contract Construction Employment
From 1978 to 1979

Harrisburg SMSA	-4.9	-6.7	-2.6	-15.2	-17.8	-20.6	-18.3	-21.8
Seven County Area	+5.0	+1.9	+5.5	- 3.3	- 5.4	- 7.3	- 7.5	-12.2
Allentown Bethlehem Easton	-6.0	-8.9	-4.9	-11.0	- 6.5	-11.1	-13.7	-14.4
Pennsylvania	+4.2	-0.3	+4.1	- 2.6	- 1.3	- 6.3	- 6.1	- 6.9

Source: Bureau of Employment Security of the Department of Labor and Industry.

Table 30

New Construction Starts: Residential

	April			May		
	1978	1979	% Change	1978	1979	% Change
0-5 miles	36	32	- 11	78	37	- 53
5-10 miles	89	58	- 35	104	61	- 41
10-15 miles	309	157	- 49	228	205	- 10
15-20 miles	120	110	- 8	115	109	- 5
	June			July		
0-5 miles	39	32	- 18	41	19	- 54
5-10 miles	65	76	+ 17	58	73	+ 26
10-15 miles	215	260	+ 21	179	138	- 23
15-20 miles	144	107	- 26	90	60	- 33
	August					
0-5 miles	46	36	- 22			
5-10 miles	68	50	- 26			
10-15 miles	281	232	- 17			
15-20 miles	93	100	8			

Source: Pennsylvania Department of Community Affairs: U.S. Census and direct contacts with local municipalities.

Although the 5 mile radius appears to be the most significantly impacted, the other radii show negative effects as well; this is significant in that normally construction activity is highest over the summer months. The construction market seems to have recovered somewhat by August, 1979. Further information on the third quarter of 1979 will be necessary to determine the temporal limits of possible TMI effects on new construction.

Builder Expectations

Another indicator of new construction confidence in the TMI area is builder expectations. The Department of Community Affairs conducted a study of builders in the south central/ southeast area of Pennsylvania regarding plans to build in the 20 mile radius of TMI. Of the 30 builders who work in the 20 mile radius of TMI, two will not build in the 5 mile ring, one will build in the 5 mile ring but did not think business would be good because of the accident, and two others who will build in the 5 mile ring gave combined accident and economic reasons why business would not be good

in the 5 mile ring. Thus, about 17 percent of the builders perceived an impact on construction activity from TMI within the 5 mile radius. Approximately, 33 percent of the builders either gave economic reasons for not building within the 20 mile radius of TMI, inclusive of the 5 mile ring, or while they would build, did not feel business would be good. These economic reasons center around unavailable or too expensive construction or mortgage money. These findings suggest that even though the condition of the economy might depress building activity in the Three Mile Island area, the potential for a reduction in new construction investment due to TMI is present. (See Table 31).

Table 31

Builder Expectations

	No Reasons	Accident Related Reasons	Economic Reasons	Economic and Accident Reasons Combined
Will not build in 20 mi. radius	4		4	
Will not build in 0-10 ring but will build in 10-20 ring	3		2	
Will not build in 0-5 ring but will build in 5-20 mile ring	4	2	2	
Will build in 5 mile ring, but felt business might not be good		1	2	2
TOTAL*	11	3	10	2

Source: Pennsylvania Department of Community Affairs

* Four builders will build within the 5 mile radius and see no problems.

Findings

Although there was widespread public apprehension over the safety of agricultural products immediately after the Three Mile Island accident, the overall economic impact of the accident on the farm community was short lived and minor. Specialized segments of the agricultural community such as milk juggers, who sell milk directly to consumers, however, did suffer financial losses.

The primary public concern revolved around the possible level of radiation present in milk and other farm commodities. Extensive monitoring of milk samples for Iodine-131 by the Pennsylvania Department of Agriculture revealed only minute levels of radiation well below the allowable state standard. Continued milk sampling since May 4, 1979, has been negative. Investigations also failed to show any relationship between the TMI accident and livestock and plant health in the area surrounding the plant.

Overall, the farm community reported minimal losses due to TMI -- 96 percent of the 300 farmers located within a 25 mile radius of the plant reported no losses due to TMI. Milk juggers in a fifteen mile radius of the plant did report losses of $60,000, in the month following the incident and sales are still lingering about 10 percent behind last year's levels. This impact dissipates with distance from the plant, and surprisingly, did not extend to the roadside vegetable sellers who are similar in many respect to milk juggers. This indicates the transitory nature of the impacts.

Overall, the total economic loss to the farm community due to TMI has been estimated at between one quarter and one half million dollars.

Radiation Analysis of Farm Products

Immediately following the March 28, 1979 initial radiation releases at TMI, the Pennsylvania Department of Agriculture began to take milk samples from farms and dairies within a 45 mile radius of the plant. The samples were analyzed for radioactive content by the Department of Environmental Resources for Iodine-131, a substance which, if received in substantial amounts, is a contributor to thyroid cancer. In addition, tests for other radioactive elements such as xenon, krypton and cesium were carried out.

The level of iodine radiation is measured in picocuries per liter. A picocurie is one-trillionth (10^{-12}) of a curie or a rem. Pennsylvania's health standard for milk allows 1,000 picocuries per liter; the federal Food and Drug Administration's allowable level is 12,000 picocuries per liter. At such levels, regulatory actions would be needed to protect the public health and safety. Such actions were not necessary due to the TMI accident.

Between March 29 and April 21, 1979, the Pennsylvania Department of Agriculture took 200 milk samples, all of which were tested for the presence of Iodine-131. The highest reading found in any of these samples was 29 picocuries per liter. Continued testing of milk since May 4, 1979, has shown less than 10 picocuries per liter for all sampling through November 23, 1979. This level is below the minimum detectable with the equipment being used. Table 32 summarizes the results of the milk sampling through November 23, 1979. While no significant radiation contamination has been discovered, sampling continues since radiation levels are normally disclosed in milk before it can be detected in other foodstuffs.

During the first three weeks in April, over 30 different food items were sampled within a 30 mile radius of TMI. This sampling also included river water, well water and tap water. No additional testing of these specific food items took place after April 24, 1979, since prior results did not merit further testing. However, on June 6, samples of fresh lettuce, radishes, rhubarb, spring onions and fresh strawberries grown within a seven mile radius of TMI were also tested and were found to be free of radioactive content. No further monitoring of foodstuffs other than milk is planned.

Livestock Analysis for Radiation - A number of animal health studies have also been undertaken by the Department of Agriculture. Data collected in May, 1979, from 100 livestock owners within a five mile radius of the crippled nuclear plant studied the TMI effects on a total of 8,200 dairy cows and heifers and 1,818 beef cattle. Of those surveyed, 95 percent reported no unusual herd health problems. The remainder reported herd health problems that were classified as routine. The Department feels that such problems would normally be expected to occur at the five percent rate in any other area of the Commonwealth.

Table 32

SUMMARY OF MILK SAMPLES ANALYZED FOR RADIOACTIVE CONTENT

Sampling Period	No. of Samples	Distance from TMI	Results
March 29 - April 21	200	All within 45 miles	0-29 pc/l*
(A total of 38 dairy farms & 15 dairies were utilized for sampling)			
April 25 - May 2	28	2-40 miles	0-13 pc/l
May 4 - 10	15	All within 40 miles	less than 10 pc/l**
May 9 - 14	13	All within 40 miles	" "
May 17 - 23	12	All within 20 miles	" "
May 24 - 31	15	All within 25 miles	" "
June 1 - 7	12	All within 25 miles	" "
June 8 - 15	12	All within 40 miles	" "
June 15 - 22	6	All within 25 miles	" "
June 22 - 29	6	All within 25 miles	" "
July 2 - 6	6	All within 25 miles	" "
July 9 - 13	6	All within 25 miles	" "
July 12 - 19	6	All within 25 miles	" "
July 23 - 27	6	All within 25 miles	" "
July 27 - August 3	6	All within 25 miles	" "
August 6 - 10	6	All within 25 miles	" "
August 16 - 20	6	All within 25 miles	" "
August 20 - 24	6	All within 25 miles	" "
August 27 - 31	6	All within 25 miles	" "
September 3 - 7	6	All within 25 miles	" "
September 10 - 14	6	All within 25 miles	" "
September 17 - 21	6	All within 25 miles	" "
September 24 - 28	6	All within 25 miles	" "
October 1 - 5	6	All within 25 miles	" "
October 8 - 12	6	All within 25 miles	" "
October 15 - 19	6	All within 25 miles	" "
October 22 - 26	6	All within 25 miles	" "
October 29 - November 2	6	All within 25 miles	" "
November 5 - 9	6	All within 25 miles	" "
November 12 - 16	6	All within 25 miles	" "
November 19 - 23	6	All within 25 miles	" "

*pc/l means picocuries per liter

**The testing equipment utilized cannot accurately test levels below 10 pc/l. The less than 10 pc/l means that the radioactive content is somewhat between 0 and 10 picocuries per liter.

Source: Pennsylvania Department of Agriculture.

Several owners of livestock residing within a few miles of TMI felt that their animal health problems resulted from the TMI incident. In each case, the Department performed extensive sampling of the livestock feedstuffs for radioactivity, performed autopsies on dead animals when possible, and carried out other diagnostic tests for various diseases. To date, none of these herd health problems have been found to be related to the incident. Indeed, the Agriculture Department has extensively studied several animal and poultry health problems in the Three Mile Area. All problems have been definitely diagnosed to be due to factors unrelated to the accident. These investigations, also, will continue.

The Department has also investigated numerous inquiries concerning plant health and insect problems and their possible relationship to TMI. To date, none has been established. The Department of Agriculture attributes the relatively cool summer and its accompanying high humidity and frequent showers to the higher incidence of plant diseases reported.

Consumer Resistance - There was a widespread public concern immediately following the incident about the safety of milk and fresh vegetables sold in the area. For example, within the 20 mile radius, two of the nation's largest firms producing candy products stopped buying local milk during the month of April. Such consumer and buyer resistance appeared immediately after the accident and was relatively short-lived. During the first days of the accident, many food retailers in the TMI area felt it necessary to inform the public that their milk for sale came from farms in places outside of the TMI vicinity. Outside of Pennsylvania, there were instances where retailers advertised that their milk did not come from this State. Moreover, there was some resistance by out-of-state dairy plants to accept locally produced milk, and there were cases where they cancelled orders for Pennsylvania milk.

Milk dealers near TMI experienced declines in sales to varying degrees. One large dairy serving the Harrisburg area found that sales dropped 18 percent during the first week following the incident and this was followed by a subsequent 15 percent decline during the second week. The dairy felt it necessary to advertise in the local newspapers that they did not utilize milk received from farms within a 10 mile radius of TMI and, in fact, had disposed of milk from within that radius. Dairies in the York, Lebanon and Lancaster areas also experienced declines in sales but to a lesser degree and for a shorter period of time.

The loss in sales of milk and other farm products just after the TMI incident was not solely due to a consumer fear over its consumption or use. It must be remembered that an

estimated 144,000 persons within a 20 mile radius voluntarily left the area, and that this reduction in potential consumers had a significant impact on retail sales. In addition, public schools, a major market for milk, were closed throughout much of the 20 mile impact area for several days. Many restaurants were also closed due to a lack of employees and customers, and this further reduced demand for certain foodstuffs.

Mitigating Factors - Once the evacuees returned to the area, the sales and consumption of local farm products returned to near normal levels. This was due to a number of reasons. Of paramount importance was the fact that the State released to the public the early results of radiation testing of milk and other foodstuffs. The low radiation levels found helped to assure the safety of consuming these foods. In addition, the publicized fact that livestock, at the time of the accident, were feeding on stored grain and not pasture also is thought to have had a calming effect. A third factor was the comparison to the radiation levels found in the Chinese nuclear explosion fallout of 1976 and 1977. At that time, radiation levels found in raw milk reached nearly 500 picocuries per liter and was not considered to be a significant health threat. When the public became aware of these factors, resistance to consumption of local products greatly diminished.

Impacts on Farmers

The Department of Agriculture undertook a study to determine the socio-economic impacts of TMI on full-time farmers living and farming within a 25 mile radius of the plant. The Department initiated collection of data in late June, 1979, from 600 farmers in the 25 mile impact area to determine possible impacts (see Table 33). The 300 responses obtained represent about a six percent sample of the estimated 5,000 farmers located within a 25 mile radius of TMI. Four groups of farmers, based upon the major type of farm enterprise, were identified. These were: 1) dairy, 2) livestock and poultry, 3) fruits and vegetables, and 4) farmers who grew grain only. In addition, data was grouped according to whether the farmers resided within 10 miles of the plant or outside the 10 mile radius.

The results of this study are felt to be representative of the total farm community. The response level accounts for nearly 61,000 farmland acres (nine percent of all farmland in the area). The results of the data collected by the Department have been presented as percentage shares of farmers experiencing particular impacts. It is necessary to

Table 33

FARMER RESPONDENTS - TMI IMPACT STUDY

	Within 10 Miles	11-25 Miles	Total
Universe of Estimated # of Farms[1/]	700	4,300	5,000
Estimated Land Acreage[1/]	95,000	555,000	650,000
Number of Farmers Responding			
Dairy	7	110	117
Livestock & Poultry	14	105	119
Fruit & Vegetables	7	39	46
Grain Only	5	17	22
TOTAL	33	271	304
Sample Size (%)	4.7	6.3	6.0
Respondent's Land Acreage	8,319	52,367	60,686
Percent of Land Acreage Covered by Sample	8.8	9.4	9.3

1/ Estimates based upon the 1978 Crop and Livestock Summary and the 1974 U.S. Agricultural Census. A proportionate share of the county's totals equal to an approximate percentage of land area within the given radius from Three Mile Island was utilized to arrive at the estimates.

Source: Pennsylvania Department of Agriculture

point out that 90 percent of the results came from farmers living beyond the 10 mile radius and therefore it is felt that comparisons of percentage shares rather than absolute numbers of farmers are more meaningful with this response distribution pattern. The results are further weighted toward the information from dairy (39 percent) and livestock and poultry farmers (39 percent), the predominant type of farming in the TMI vicinity.

Summary - The vast majority of farmers -- 96 percent -- reported no losses due to TMI. Overall, only a small percentage of the farmers experienced any immediate economic impact upon the occurrence of the accident -- only four percent of the respondents in the 25 mile radius reported they had experienced losses in sales of agricultural commodities. Those losses took such forms as loss in milk sales, cancellation of orders, and expressions that business levels were below those of last year. Furthermore, at the time the data was collected (July-August) there were only three percent reporting any continued losses. A greater share (10 percent) of the fruit and vegetable farmers reported such continuing losses.

It is significant that a larger share of the farmers in the 10 mile radius reported that they had experienced losses, and continue to do so, than farmers in the 11-25 mile radius -- generally three times as great. The individual reported losses ranged from $25 to several thousand dollars per farm.

The study also indicated that consumer resistance to the buying of agricultural products was reported by only five percent of the farmers, but was markedly higher (13 percent) among farmers within a 10 mile radius of TMI than those beyond. Some farmers reported that previous customers did not show up at all to purchase products while other customers needed to be convinced of the products' safety before purchasing. What this means is that in spite of the declared safety for consumption there may be a small segment of the buying population which remains cautious and concerned over TMI's effects on food. In addition, this small residual resistance may be compounded by other factors such as the shortage of gasoline, changes in buying habits of the consumer, and decline of the family's buying power due to inflation which may be affecting the purchase of locally produced commodities.

Milk Juggers and Fresh Produce Farmers

In reviewing the results on the study of TMI's impacts on farmers within a twenty five (25) radius of TMI, described above, it became apparent that farmers selling commodities directly to consumers may have been more susceptible to financial loss after the immediate accident period than those selling to a processor or food handler. Subsequently, the Department of Agriculture initiated another study in late October collecting data from over 100 farmers within 25 miles of the TMI plant who sell agricultural products directly to the public. These farmers,who comprise a small segment of the total farm community, include milk juggers (who process and sell milk on their farm) and those farmers who raise fruit, vegetables and other produce and sell at roadside stands and/or at farmers markets. The purpose was to measure any economic change as compared to previous years and determine contributory factors.

By mid-November, 1979, a total of 32 responses had been received and analyzed. While the results of this effort are not yet complete, 44 percent who reported to date show an increase in sales (14), 40 percent a decrease in sales (13), and 16 percent no difference from prior years (5). The majority of those reporting a decrease in sales reported it to be between 11-25% in cash receipts. The majority of those reporting an increase in sales reported an increase of between 6-10% in cash receipts.

Of the 13 who reported a decrease in sales this year as compared with prior years, only five attributed the decrease fully or partly to the Three Mile Island incident. (These five comprise 16 percent of the 32 total responses). The total who reported either a decrease in sales (13) or a lack of increase in sales (i.e., the five with no difference) is 18. Taking into consideration the five who reported TMI as fully or partly responsible for decreases in sales, the relative ranking of all reported reasons for either a decrease or lack of increase among the 18 respondents are: the high cost and unavailability of gasoline (46%), TMI (19%), a drop in tourism (19%) and poor quality of fresh produce (16%).

Milk Juggers - Of the 11 milk juggers reporting, five saw a decrease in sales this year. Four attributed the decrease to the Three Mile Island incident; these juggers are located within a fifteen mile radius from Three Mile Island and their total losses amounted to about $60,000. They reported their greatest economic loss occurred during the first four to five weeks following the Three Mile Island incident, and their sales are still lingering behind last years sales by approximately 10 percent. One farmer located fifteen miles from Three Mile Island felt that his sales

were increased as a result of Three Mile Island because people thought that he was located outside of the area that received radioactive contamination. All of the milk juggers located within ten miles of Three Mile Island and responding to the study reported decreased sales and consumer resistance as a result of Three Mile Island. Only one out of the seven located ten or more miles from Three Mile Island reported losses due to the accident.

Fresh Produce Farmers - Of the twenty-one farmers selling fresh produce direct to consumers, 52 percent reported an increase in sales, 38 percent a decrease, the remaining 10 percent said sales were similar to last year. Almost all those reporting a decrease in sales felt it was due to the gasoline situation and a drop in tourism, and/or the poor quality of produce. Only one respondent blamed TMI and he was located about fifteen miles from the plant. Other farmers selling fresh produce located closer to Three Mile Island did not feel that the Three Mile Island incident affected their sales of fresh produce.

At first the difference between the reporting of milk juggers and fresh produce farmers may appear to be contradictory. However, fresh produce was not in season when the Three Mile Island incident occurred at the end of March. Very little locally grown fresh produce was available until June with the bulk being harvested in July, August and September and continuing into the fall. On the other hand, the milk jugger sells to consumers the whole year and his sales are normally relatively uniform throughout the year, and any increases or decreases are easily noticed. In addition, the news media coverage of the Iodine-131 content of milk immediately made the consumer aware of a possible danger, real or perceived which resulted in consumer resistance to a product. To those milk juggers located within about ten miles of Three Mile Island consumer resistance appears to have played a very important role in decreased milk sales, particularly during the first four to five weeks following the Three Mile Island incident. If the Three Mile Island incident had occurred during the summer or fall, a similar amount of consumer resistance probably would have been noticed by fresh produce farmers. The losses reported are small in comparison to the total dollar volume of agricultural commodities produced in the Three Mile Island area, but are very real to the individual farmers which were affected.

With the information collected from both studies, it is difficult to precisely determine the total economic loss which was incurred by farmers as a result of the Three Mile Island incident. However, as a estimate, it would appear that the total loss to farmers that can be directly attributed to the

Three Mile Island incident would be between $250,000 and $500,000. The above estimate does not include the increased cost of electric power to farmers in the area as a result of the shutdown of Unit II, and future decisions in allowing Unit I to be put back into operation. This increase in cost may in the long run be a greater economic loss to the farmer than the initial losses occurring from the Three Mile Island scare in March and April of this year.

IMPACTS ON STATE AND LOCAL GOVERNMENT

The Three Mile Island incident and the fear, concern and stress it created affected both the Commonwealth of Pennsylvania and local governments within a wide radius of the plant site. This chapter provides a preliminary assessment of the impacts which the public sector experienced in the short term.

State Government Impacts

A measure of the TMI incident's cost to State government can be gained from data concerning salaries paid to personnel who were granted administrative leave or overtime and from additional non-personnel expenses for a period following the accident. The Office of Budget and Administration and others have determined this information for all state agencies which are under the Governor's jurisdiction, as well as for those not directly under his jurisdiction.

Administrative Leave

State agencies granted 23,395 hours of administrative leave at a cost of $173,131 for the period from March 30, 1979 to April 9, 1979. Administrative leave is time away from work with salary at the appropriate straight time rate of pay. The costs were based upon the pay rate in effect on the dates when the employees were on administrative leave, and do not include employee benefit costs. (If benefit costs were to be considered, the cost data would be higher by 30%).

Because of the feelings of danger and concern generated by the TMI incident, administrative leave was granted to certain State employees during the period from March 30 through April 9, 1979. Those eligible for administrative leave were:

- Pregnant employees who lived or worked within a five mile radius of Three Mile Island.
- Employees with children five years of age and under who lived within five miles of Three Mile Island.
- Employees who lived or worked within a 20 mile radius of TMI on March 30, 1979, and subsequently left work due to concerns arising from the Three Mile Island incident.

Overtime Pay Costs

From March 30, 1979 through October, 1979, TMI related overtime pay for state employees totaled $124,910.* Agencies incurring the largest overtime costs were the Pennsylvania Emergency Management Agency, Department of Environmental Resources, the State Police, the Justice Department, and the Governor's Office.

Overtime work which was necessary to meet the special requirements of the accident also includes compensatory time. State personnel regulations applied to TMI related overtime. State employees covered by union representation are eligible for either overtime pay or compensatory time, depending upon a mutual agreement with their superiors. In either case, time and a half is granted with holidays exacting a premium. Supervisory employees are not normally granted overtime pay, but are eligible for compensatory time equal to the exact number of overtime hours worked.

Additional Expenses

Additional non-personnel expenses totaling $314,124 were incurred by many state agencies between March 30, 1979, and the end of October, 1979, as a result of the accident.

The Departments of Health and Environmental Resources, the Emergency Management Agency and the Public Utility Commission incurred the majority of these additional expenses. Included in these expenditures were Health Department contracts for population radiation dose assessments, TMI health related economic cost studies, Environmental Resource Department sampling and monitoring equipment, an Emergency Management Agency booklet about nuclear radiation for public distribution and Public Utility Commission legal expenses.

* Overtime costs of $2,078 were incurred by the Pennsylvania Turnpike Commission which operates solely on tolls, not taxes, and therefore this figure is not included as a state expense.

*Summary of State Government TMI Related Personnel and Expense Costs

Overtime Pay	$124,910
Administrative Leave	$173,131
**National Guard Wages	$ 17,291
Total Personnel Cost	$315,332
Additional Expenses	$314,419
Total Personnel and Expenses	$629,751

*Overtime costs of $2,078 were incurred by the Pennsylvania Turnpike Commission, which operates solely on tolls not taxes, and therefore this figure was not included as a state expense.

**The National Guard was paid straight time by the state - administrative leave and overtime are not applicable to the Guard.

State Government Revenue

Another possible measurement tool for assessing the potential impact of the accident as to investigate factoring out its effect if any, on state revenues.

The only legitimate technique for determining the impact, if any, on state revenues of TMI is to compare the *a priori* projected revenue with the actual post event revenue. To be valied, the projected revenue must be based on historic experience with adjustments for changing circumstances. Comparing one month in 1979 to one month in 1978 is not a legitimate analytical exercise for many reasons, not the least important of which is that two points do not define a defendable trend.

Certain difficulties in data collection and analysis stemming from timeliness, distribution and location, plus ongoing Revenue Department file evaluations resulting in reporting schedule changes as defined below make any definitive conclusions premature at this time.

Personal Income

The Department of Revenue receives personal income tax payments from three sources at varying times throughout the year. The major portion of the PIT receipts is derived from the employers' withholding system and is remitted (like the sales tax) on three different schedules; semi-monthly, monthly and quarterly depending on the number of employees. The distribution of filers in the personal income tax system, like that for the sales tax system, is unstable through time because of on-going efforts to correctly categorize taxpayers. This renders historic comparisons and allocations of the receipts to the proper earnings period impossible. Furthermore, the personal income tax employer's withholding reports, like those in the sales tax system are not location specific since receipts are recorded according to the address of the firm's headquarters.

The remaining sources of personal income tax receipts are the individual remittances of estimated liability and final liability. Clearly, final liability payments (due April 15th of the following year) which are based on 365 days of income are too general for use in assessing the possible effects of a four day abberation. The estimated payments are made quarterly by those individuals who expect to owe the Commonwealth more than $200 at the close of the year and by definition are not wholly accurate records of income.

The 1979 income tax data for these two categories of taxpayers will not be available until April, 1980, but it will be impossible, even then, to separate the effects of inflation, unemployment and TMI on these receipts.

Sales and Use Tax

For a variety of reasons, the sales and use tax data is inadequate for the type of analysis required here.

1. Motor Vehicle Sales Tax collections are included in these figures. This is a problem because the behavior of the Motor Vehicle Sales Tax series is significantly different than that of other sales tax categories and its relative proportion of total collections is variable. Thus, aggregate sales tax comparisons from year-to-year are unacceptable.

2. Remittance of dales tax by vendors occurs in a three-tiered fashion. Vendor's are required to file on a semi-monthly, monthly or quarterly basis depending on the size of their remittance. Many

firms have been switched to different filing categories recently, making comparisons with previous years inappropriate since the filer distribution has been irreconcilably altered.

3. Pennsylvania sales tax excludes essential items, so in effect, we can only draw conclusions about purchases of non-essential commodities. In a period such as that surrounding the TMI incident, one might expect many non-essential purchases to be postponed or relocated but not necessarily foregone. Thus, to fully account for the sales tax impact of the incident, it would be necessary to fully account for the inter-temporal and geographic shifts. For the reasons discussed above and below, such an accounting is impossible.

4. Sales tax is reported from the firm's headquarters and not necessarily from the sales locale. For example, John Wanamaker's remits all its sales tax receipts from its Philadelphia headquarters, so despite the location of several Wanamaker's within the six county TMI impact area, no record of their economic activity is reflected in the reports for these six counties. Conversely, Giant Food Corporation is located within this area but does business throughout the Commonwealth. Thus, its reports would cause the actual sales activity in the area to be overstated. Finally, the tax remittances of firms headquartered outside of Pennsylvania, but doing business in the TMI impact area would also not be reflected in the reports for the six counties.

Realty Transfer Tax

Pennsylvania levies a 1% tax on the sale price of all residential and commercial property payable at the settlement date. Thus, by analyzing trends in these tax receipts in the TMI region before and after the incident, it may be possible to discern the impact of the incident on the regional's property values.

A first order auto regressive moving-average (ARMA) model was used to forecast the Realty Transfer Tax receipts for each month, January through June, of 1979 based on actual experience from 1972 through 1978. Separate forecasts were made for each county surrounding Three Mile Island (Dauphin, Cumberland, Lancaster, Lebanon, Perry and York) and total tax receipts and average tax per real estate transaction were predicted.*

From these predicted values, the implicit predicted growth rates were calculated.

The results of these analyses are presented in Table 34 and 34-A which compare the predicted and actual growth rates for total realty transfer tax receipts and average receipts per transaction, respectively. On average, there exists a two-month lag between the date a property is offered for sale and the date the realty transfer is recorded so only the June actual and forecasted growth rates reflect economic activity occurring after the Three Mile Island incident. However, the January through May comparisons are important as controls on the interpretation of the June results.

Table 34 indicates that forecasted growth was uniformly positive for each county in June but actual growth was uniformally negative for each county in that month. Analyzed independently, this would suggest that the incident at Three Mile Island had a significant negative impact on the area's real estate market. However, in the April and May comparisons which reflect actual and predicted sales occurring before the Three Mile Island incident, the forecasts again generally had the opposite signs of the actual growth statistitics which suggests factors other than the nuclear accident were affecting the real estate market throughout this three-month period.

Analysis of the results presented in Table 34-A in conjunction with those presented in Table 34 offers some limited insights into the dynamics of the area's real estate market shortly after the incident. Most importantly, no general trend in the average tax per sale (and therefore in the average sale price, in constant dollars) can be detected. However, in June in every county total tax receipts declined more than the average tax per transaction and, in at least one case (Lancaster County), average tax per transaction rose while total tax receipts fell. This suggests that the decline in total receipts is attributable to reduced sales volume rather than reduced property values. In fact, it must be true that average sales price, measured in constant dollars were not declining or falling shortly after the incident but must actually have been rising.

Since the incident apparently had no negative impact on property values, no case can be made for compensating those who owned property in the area at the time of the incident. In fact, it appears that the only dislocation to the real estate market occurring during this period was an increase in the average time required to consummate a property transfer.

However, even this phenonenon cannot be attributed solely to the Three Mile incident. Analysis of Tables 34 and 34-A suggests that total receipts (i.e., sales volume was declining or equivalently, the sales period was lenthening) at least two months before the accident occurred.

*In both cases, the data was corrected for inflation by dividing each monthly observation by the Pennsylvania housing price index.

A more plausible explanation for this trend might be the increasing unavailability of mortgages as evidenced by the increasing number of institutions refusing to even accept mortgage applications throughout this period.

Thus, when analyzed in context with other events occurring in the region during this period, no definitive effect of the Three Mile Island incident on the value of property can be discerned.

TABLE 34

Forecast and Actual Growth Rates for 1979 Total
Real Estate Transfer Tax Receipts

Month	Forecast Growth Rate (%)						Actual Growth Rate (%)					
	Dauphin	Cumberland	Lancaster	Lebanon	Perry	York	Dauphin	Cumberland	Lancaster	Lebanon	Perry	York
January	.22	1.47	.21	.43	.36	.42	.38	-9.78	1.05	-.70	1.03	1.65
February	.10	.31	.49	.11	.64	-.04	-2.8	.58	.70	-.35	2.19	1.03
March	.15	.55	.45	-.30	-.13	.14	-1.42	-3.04	-.58	3.69	4.30	-.27
April	-.03	-.13	-.05	.17	.55	.15	1.21	.26	-.58	-.62	-.89	-.98
May	.34	.21	.39	.07	-.87	.41	-2.13	-1.86	1.89	-.61	-4.02	-.62
June	.71	.21	.50	.37	.78	.54	-3.55	-2.84	-1.52	-2.09	-7.49	-2.39

TABLE 34-A

Forecast and Actual Growth Rates for 1979 Average
Real Estate Transfer Taxes per Transaction

Month	Forecast Growth Rate (%)						Actual Growth Rate (%)					
	Dauphin	Cumberland	Lancaster	Lebanon	Perry	York	Dauphin	Cumberland	Lancaster	Lebanon	Perry	York
January	-.45	.48	-.27	.71	.50	.39	2.75	-.76	-.06	-1.16	-.24	.61
February	.31	.35	.02	.52	.98	.03	-1.61	-.75	-1.35	-.07	.50	.67
March	.48	.51	-.27	.14	.20	.26	.11	-.87	-.20	2.36	2.29	-.46
April	.15	-.01	-.45	.41	.63	.33	-1.76	-.27	-.33	-.40	-.89	-.51
May	.31	.21	-.14	.31	.64	.15	-.80	-1.20	4.42	-1.38	-1.02	.55
June	.64	-.02	-.11	.50	.30	.11	-2.52	0.00	2.34	-.35	-2.37	-.82

Impacts on Local Government

The TMI incident resulted in many communities sustaining expenditures above and beyond their normal budgets allocated for the provision of governmental services during the crisis period. For communities generally in close proximity to the TMI plant, substantial expenditures were necessary.

The TMI event caused many local governments to respond to the voluntary evacuation of some of their residents and incur various emergency expenses. Many communities found it necessary to provide additional police protection to protect the property of those who left their homes unattended. For others, there were problems related to the evacuation of the elderly and the infirm. Local governments also made plans for the movement of institutionalized persons and school children in the event that an evacuation of their community became necessary. Some of the increased costs resulted from governmental employees working long overtime hours in order to be ready to participate in evacuation.

The Department of Community Affairs in its inventory of local governments (data assembled from responses from 68 governmental units up to mid-August) has examined the magnitude of the accident/related costs these bodies incurred. Three counties and 34 local communities reported that they had expenditures - reported dollars were $113,000. The range of these costs was quite large -- from a low figure of $16 to a high figure of almost $23,000. Five of these local communities reported that they had costs, but they were "minimal".

The 29 local governments which reported expenditures indicated that they expended $71,311 as a result of TMI; this averages $2,459 per government. In addition, the three counties which reported additional TMI related costs (Cumberland, Dauphin and York) spent $41,848 -- an average of $13,949 for each county.

A portion of the funds expended by local governments may be recovered via outstanding insurance claims payable by Metropolitan Edison or its insurance carriers. To date, 27 local municipalities and government related agencies have filed claims for a minimum of $70,151. As of December 10, 1979, Metropolitan Edison has made repayment to three municipalities for $10,417. These actions are discussed in more detail in the section on long range problems.

Community Programs

The TMI incident could result in a series of inter-related problems which limit or frustrate the ability of local government to carry out community development programs.

The federal government has numerous programs designed to help local governments overcome a wide range of problems. One very important activity extremely relevant to helping communities overcome problems and further their development - such as potential problems which may be affecting communities as a result of the incident - is the community development block grant provided by the U.S. Department of Housing and Urban Development.

The community development block grant was considered to be particularly important because of the broad range of activities for which funds can be made available. Within in seven counties around TMI, there are 120 local communities having all or a portion of their area within the 20 mile radius. According to the Department of Community Affairs, only six of them are currently receiving block grants. (They are CDBG entitlement communities). They are the cities of Harrisburg, York, and Lebanon, the boroughs of Middletown and Steelton, and Swatara Township (Dauphin County). Only Middletown is within the 5 mile radius of the TMI plant. Lebanon and York lie outside the 10 mile radius. However, in reality, all the communities within the 20 mile radius are "potential" recipients of grants, if they apply to and participate under one of the various program categories such as the Entitlement Grants Program, Small Cities Program, or Urban Counties Program. Therefore, because all communities in the 20 mile radius have the potential to be "CDBG communities", the impacts felt by any of them are believed to be relevant. So even though the study is to focus on CDBG communities, knowledge of impacts on currently non-participating communities is helpful.

The objectives of the community development block grants are to either develop or to assist viable communities, including provision of decent housing and a suitable living environment and to expand economic opportunities (principally) for persons of low and moderate income. Grants can be used for such purposes as neighborhood revitalization, economic development, and providing improved community facilities. Specific activities can include such projects as rehabilitation of public works or housing, code enforcement, and associated administrative costs.

Preliminary information indicates little to no community programs effect on local townships in the TMI area. In Swatara, Lower Swatara, and Londonderry Townships, the new 1980 budgets do not reflect expenses or losses attributable to TMI. (Harrisburg Evening News, 11/15/79). Further budget revelations from Cumberland County, Middletown, and Middle Paxton Township exhibit no TMI expenditure deficits. (Harrisburg Evening News, 12/4/79).

Community Development

Of particular interest with regard to local government is the impact which TMI may have had on community development. This encompasses those impacts which may be affecting community program and service expectations, such as those provided through community development block grants. To ascertain this information, the problems which TMI caused local governments need to be understood as well as their relevance to community development programs.

The Department of Community Affairs initiated efforts to gather information in June, 1979 to determine problems which the 120 local governments and the counties lying partly or totally within the 20 mile radius encountered as a direct result of the incident. Sixty-eight units of government had provided responses by mid-August.

Information was sought concerning six community development related areas - community development goals and priorities, commercial revitalization, municipal services, experience in the municipal bond market, anticipated future costs or reductions in revenues, and the need for federal or state grants to overcome TMI-related problems. The results indicate that the problems did not seem to involve many communities. Fifteen local communities indicated that they experienced or could perhaps expect to encounter one or more of the six problem areas. Three county responses also indicated probems.

Except for two cases, each of the problem areas seem to affect only a few communities. Future revenue losses or future costs were anticipated or considered a possibility by six of the communities and one county; five communities felt there was some impact on planning activities, with emphasis on the need for upgrading emergency preparedness and evacuation plans. In addition, one county indicated that emergency preparedness has taken on a higher priority.

In the area of problems related to commercial revitalization and experiences on the bond market, it appears that, at the time of data collection, it was too early to tell if such problems would be encountered. However, one county reported that since TMI, its bond rating has been downgraded from AAA to AA, which may have had as its contributing cause changes in tax base and budgetary outlook.

Where impacts could be clearly ascertained from this early assessment, it appears that there was no perception of any singular widespread problem affecting a large number of communities. Because so few communities which responded listed problems, whatever impact or disruption TMI did have must have been mostly of a short term nature. And, in almost all cases, neither federal nor state grants were anticipated to be needed to solve them.

As a follow-up to this initial inventory, the Department of Community Affairs will be contacting communities again to determine any community development problems which may be surfacing as time progresses beyond the incident. And the communities within the 20 mile radius will be assisted by DCA and the Capitol Region Planning and Development Agency in identifying any impediments to implementing community development programs during the study period.

Technical Assistance

The Department of Community Affairs will provide technical assistance in a support role to any municipality with problems resulting from the TMI incident that cannot be handled locally. In order to identify areas where such help is needed, the Department's inventory of governmental problems stemming from TMI also asked for areas where DCA may be of assistance. This elicited 22 requests for technical assistance. Some communities requested assistance in areas which go beyond the six specific community development areas discussed earlier -- hence there were more requests for assistance than there were governmental units which identified community development related problems. The table on the next page shows what was requested.

Most often communities requested assistance of the State in establishing or improving communication systems to improve civil defense emergency response capabilities. Of the 22 requests, two communities requesting assistance were "CDBG participating" communities. One of the CDBG communities responding did not identify technical assistance needs. The two requesting assistance wanted help in economic and community development. The Department of Community Affairs, through its Harrisburg Regional Office and the Bureau of Local Government Services, will follow up in providing the technical assistance.

Table 35

Technical Assistance Requested

Communications Systems	8
Revenue Sharing	7
Economic Development	5
Community Development	4
Intergovernmental Cooperation	4
Code Enforcement	4
Capital Programming	3
Budgeting	2
Accounting	2
Public Works Management	1

Source: Department of Community Affairs

LONG RANGE IMPACTS

The accident at TMI Unit #2 coupled with the continued outage status of TMI Unit #1 (which was down at the time of the accident for routine refueling but has not been re-activated pending resolution of safety questions) carries significant long term economic impacts for Pennsylvania ratepayers served by Metropolitan Edison and its corporate sister, Pennsylvania Electric. Together the two utilities serve a wide geographic area of the Commonwealth stretching from Easton on the Delaware River to Erie in the north-western corner of the State. They serve almost 850,000 customers encompassing a total population of over 2.3 million people.

The generating capacity of the two Three Mile Island nuclear reactors is more than 1600 megawatts - 880 megawatts from Unit #2 alone. Together this supplies 38 percent of all Metropolitan Edison's generated power and 13 percent of Pennsylvania Electric's. In order to make up the deficit caused by the shutdown, the two utilities have been purchasing power from other utilities. Costs have been estimated at $22 million per month or $264 million per year. If TMI Unit #1 goes back on line, the monthly cost is estimated to decline to approximately $10 million per month.

The nonoperating status of both TMI units, portends a signi-ficant, adverse long term economic dislocation for residential, commercial and industrial users. A federal Department of Energy study has estimated that the monthly cost for the average residential customer of Metropolitan Edison has risen $7.50 due to the accident. Intensive energy using industries in the area served by Metropolitan Edison and Pennsylvania Electric have also expressed caution about expansion and new investment plans pending the outcome of decisions on both units.

The outlook for the two TMI nuclear generators is strikingly different. TMI Unit #2, which was damaged in the accident, cannot be brought back onto line until January, 1983 at the absolute earliest. Costs for rehabilitation range from $300 to $500 million and the operating utility is evaluating the possibility of converting TMI to a coal fire plant or completely replacing it either on the island or an entirely new site. Costs for these options range from an estimated $468 million to $1,176 million. TMI Unit #1 is in a unique situation prompted by the events which happened to its twin. Although it has been refueled and can begin functioning, the Nuclear Regulatory Commission has witheld permission for restart pending resolution of safety questions. It is presently unclear when these issues will be decided. In addition, the Pennsylvania Public Utility Commission has issued a draw clause on Unit #1 which could serve to remove the fixed costs for this unit from Metropolitan Edison's rate base. Such an action would have a very serious financial impact on the viability of the operating utility.

Paradoxically enough, the higher electricity costs are only being experienced by some of the residents within a twenty mile radius of the plant. Metropolitan Edison basically serves portions of eastern Pennsylvania, York and Lebanon Counties. Lancaster, Cumberland and Dauphin Counties, which hold the bulk of 20 mile radius population, are served by a nonaffected utility. Consequently, most of the residents in the area surrounding TMI have no vested economic interest in the reopening of either unit. In fact, there are indications that local public sentiments will be strongly opposed to the restart of Unit #1 as well as Unit #2. On the other hand, Metropolitan Edison/Pennsylvania Electric customers, most of whom live nowhere near TMI, and hence, are not affected by any real or perceived safety questions, can be expected to lobby for restart of Unit #1 to reduce their electricity cost. The impact on higher electricity costs for residential, commercial and industrial customers will be explored and reported in greater detail in the final consolidated report.

Long Range Impacts on the Manufacturing Sector

Expansion Plans of Manufacturing Establishments - In the study of TMI impacts on the manufacturing sector, conducted by the Department of Commerce, the effects of electricity price rate increases were examined for their impact on expansion plans. This study found that rate increases of up to 40 percent would affect the expansion plans of over 40 percent of all manufacturing firms and over 50 percent of the food processing firms. Even an increase of 10 percent would affect the plans of one-third of all establishments. Some firms have stated that utility bills are already hurting their business, and some indicated that they would consider relocating if there are increased electricity costs.

Without considering electricity prices, an estimated two-thirds of all manufacturing establishments were willing to expand in spite of TMI (if the need should arise). This willingness to expand occurred among establishments of every employment size group. Given the unique and unsettling nature of this incident, this finding is rather amazing.

The study found that over 21 percent of all manufacturing firms would not consider expanding within this area as a result of TMI, irrespective of whether they were actually considering expanding or not. It would seem that the experiences which some firms encountered - disruptions during the incident and declines in factory orders which may have been related to either an actual or perceived product image problem - resulted (by late May) in reservations concerning expansion on the part of an estimated 246 firms.

For example, about 25 percent of the firms in the employment size group 1-99 expressed an unwillingness to expand. Nevertheless, while the smaller firms indicated a greater frequency of concern than the larger firms, there were expressions of reservation on the part of some larger firms as well, with the exception of the large food processors.

The food processing industry would appear to have less reservations concerning expansion - almost 75 percent would consider expanding after the TMI experience. This reflects the manpower and geographic locational advantages which Central Pennsylvania affords the food industry.

Industry's expansion plans may also be affected by what happens over the longer term. The degree to which Central Pennsylvania's "image" is restored as a safe place to live and work will play a major role in each individual firm's decision whether to expand or not. For those already located in the area, no problems in recruiting personnel to relocate in the greater TMI area have been reported. Additionally, there is a concern about increased electricity rates that may result from TMI.

The future expansion activities of establishments presently in the TMI area and the degree to which these firms overcome the adversities created by TMI will serve as an economic indicator to other firms outside the area. Many of these may be considering a location here for their business activity or expansion. In summary, confidence as expressed in carrying out expansion by the existing business community will serve to engender interest and confidence on the part of others outside of the TMI area.

Long Range Effects

Some of the long term effects of TMI can be inferred from information concerning opinions of respondents to Commerce's study of the impacts of TMI on expansion plans, as well as attitudes about potential increased electricity cost. If entities would elect not to remain or expand their business in the area because of TMI, this would be real significant economic impact. This decision could be based upon reluctance to remain or expand due to the fear of another accident or due to escalating costs of electricity.

Impacts on Expansion Plans - An estimated 78 percent of the nonmanufacturing entities would be willing to expand (if their business were to merit expansion), regardless of their experience with the accident at Three Mile Island. Only an estimated 14 percent would be unwilling to expand. By way of comparison the share of firms willing to expand is much higher within the nonmanufacturing sector than in manufacturing. This finding is remarkable, given the fact that the immediate total losses sustained in nonmanufacturing were much higher. Many of the nonmanufacturing sectors had losses in values of business of well over $6,000 per entity.

Among those that would not expand (the 14 percent) the wholesale and retail trade sectors each had 19 percent that were unwilling to expand. Other sectors with a "higher than average reluctance" to expand were finance, insurance, and real estate and services (15 and 16 percent respectively).

These four sectors sustained over 94 percent of the total business losses in the immediate period after the accident - and wholesale and retail trade and finance have not fared well due to the slackening economic conditions which have affected the area during 1979.

Yet, it appears that the nonmanufacturing sector as a whole remains optimistic about the area, because only 14 percent of the entities seemed unwilling to expand, although 23 percent of them felt their business levels were below normal in September, 1979.

Possible Effects of Electricity Rate Increases - The Department of Commerce's study found that 36 percent of the nonmanufacturing entities' plans to expand or remain in the area would be affected by an increase in electricity rates as small as 10 percent. This is very similar to the effects that a 10 percent increase would be expected to have on the

manufacturing sector (where nearly 33 percent of the establishments were estimated to have a similar unwillingness to expand or remain in the area with that size of electricity cost increase).

It is alarming that nearly 50 percent of the retail trade entities would be unwilling to expand in the light of only a 10 percent increase. The mining sector would also be similarly sensitive to such an increase. (Of course, there are a great many more retail than mining establishments, so the effect on the area's growth would be much more devastating, since over 3,000 retail establishments could be involved).

If the costs were to increase by 25 percent, there occurs a marked difference concerning the willingness to expand or remain in the area between manufacturing and nonmanufacturing. The Commerce Department's study found that electricity cost increases of this magnitude would result in two-thirds of the nonmanufacturing entities being unwilling to expand or remain in the area.

An identical 25 percent increase would affect the plans of about 39 percent of the manufacturing establishments. In other words, a 25 percent increase would affect the plans of one out of every three manufacturing establishments and two out of every three nonmanufacturing entities (including four out of every five of those in the retail trade sector).

Beyond a 25 percent increase, the impacts would be devastating. Over three-fourths of all nonmanufacturing entities would be affected with the exception of the finance, insurance and real estate sectors.

Table 36 on the next page summarizes the study's findings concerning effects of electricity cost increases on the expansion plans of both manufacturing and nonmanufacturing.

Table 36

Estimated Impacts of Different Increased Electricity Costs
Percent that Would Have Expansion Plans Affected

	10% Increase	25% Increase	35-40% Increase
Manufacturing	32.5	38.7	41.2
SIC 20	35.8	52.7	52.7
All other SIC's	32.0	36.7	39.5
Nonmanufacturing	35.8	67.8	77.6
Agriculture, etc.	5.1	97.5	97.5
Mining	53.8	100.0	100.0
Construction	30.0	67.5	68.4
Transp. & Public Utilities	21.1	73.0	76.7
Wholesale Trade	36.0	43.0	70.6
Retail Trade	48.6	80.1	86.8
Finance, etc.	32.2	41.4	43.2
Services	30.6	66.4	82.2

Source: Pennsylvania Department of Commerce, Bureau of Statistics, Research and Planning.

Pending Legal Actions

Background - These two insurance pools were formed in 1956 to provide both liability and physical property damage coverage for the operators of nuclear power plants. The utilities are regulated and limited by provisions of the Atomic Energy Act of 1956 which allowed the private sector to develop atomic power for non-military purposes and the Price-Anderson.

With the Congressional enactment of the Atomic Energy Act of 1954 and the Price-Anderson Act of 1957, which permitted the private sector to develop nuclear power for peaceful purposes, the need for insurance to protect utilities and other users from liability suits was and is being met by pools of insurers who voluntarily agreed to provide the financial responsibility limits set by the then Atomic Energy Commission (now Nuclear Regulatory Commission) in accordance with the provisions of those Acts. Price-Anderson set the liability limit due to a nuclear accident at $560,000,000 per site with congressional authority to provide additional funds if necessary. While initially the pools provided

$60,000,000 of the $560,000,000 Price-Anderson liability limit, their capacity has risen steadily to today's $160,000,000. The second layer is provided by assessing each nuclear reactor in the United States up to $5,000,000. With 68 reactors this would provide $340,000,000. The third and final layer of $80,000,000 is available through the Federal Government. As the pools capacity increases, the Federal Government's layer is similarly diminished.

The Nuclear Regulatory Commission establishes the financial requirements for each nuclear site. TMI is required to provide $140,000,000 of financial responsibility limits, the maximum then available from the pools. In addition, the Nuclear Insurers provide property damage insurance for the site itself. TMI has $300,000,000 coverage for repairing the damaged reactor and other property at the island.

Individual property owners near nuclear power plants cannot purchase insurance against a nuclear accident on their own. The reasons for this exclusion are: the catastrophic potential of a nuclear power plant failure is virtually unlimited; the cost to insure individual property owners most susceptible to a nuclear accident is considered to be astronomical; and, most importantly, the Price-Anderson Act requires nuclear power plant owners to maintain liability insurance against radioactive contamination, negating the need to insure innocent third parties from damages sustained in the event of a nuclear accident.

Pending Claims Only the relocation and wage loss claims which were discussed earlier, have been settled to date by the nuclear insurers. These claims represent simple and straightforward damages easily decidable as a result of the Governor's advisory of March 30, 1979, that pregnant women and families with pre-school age children evacuate from within the five mile radius of TMI.

The remainder of the lawsuits discussed below represent unique and difficult legal questions which will be addressed in a courtroom setting. Therefore, no conclusions or analysis beyond the most cursory level can be formulated regarding these claims. Given the status of federal court dockets, the substantial, unprecedented nature and amount of damage levels alleged, it is expected that it will take years to ultimately resolve these claims.

The following table summarizes paid and outstanding claims by type.

Table 37

Insurance Actions by Type of Claim
(as of October 26, 1979)

	Claims Paid		Claims Outstanding		
	No.	Amount	No.	Amount	
Individual Relocation	3,162	$1,214,186			
Individual Wage Loss	627	$ 91,221			
Total	3,789	$1,305,407			
Government Agency Claims			27	$ 70,151	1
Business Interruption Claims			115	$ 1,700,000	2
Individual Lawsuits			18		3
Class Action Lawsuits (Consolidates 73 named plaintiffs and two other actions)			3		3

1/ Includes 19 Governmental Units with disclosed amounts and four other government-related claims with disclosed amounts.

2/ At a minimum.

3/ Given a few successful claims, awards could exceed $560,000,000.

Outstanding Insurance Claims

Governments and government-related agencies have filed 27 claims for a minimum of $70,151. Several of these which have filed claims to date have listed an undisclosed amount of damages, reserving the right to develop their claim in greater detail at a later date.

Metropolitan Edison has made repayment to 21 municipalities to date for extraordinary costs incurred during the accident. For example, Middletown Borough received $8,352 from Met Ed, the full amount claimed, for extra police and communications costs during the crisis period. Londonderry Township, the municipality in which the TMI plant is located, received $1,972 from Met Ed for maintenance and repair of township roads, while Harrisburg was reimbursed $4,653.

Twenty other municipalities and counties within a ten mile radius of the plant have also filed claims which are being processed by Met Ed. Volunteer fire companies will also be offered restitution.

Middletown Borough also received $7,500 from the Nuclear Regulatory Commission and $1,362 from the Pennsylvania Health Department for the use of municipal facilities during and after the crisis period.

Business interruption claims have been filed by 115 concerns for damages of at least $1,700,000. One firm alone, a major foodstuffs processor, has an alleged income loss of nearly $867,000. Many of the claims filed to date are for unspecified damages.

Eighteen individual and one class action lawsuit against the General Public Utilities Corporation, Metropolitan Edison, and its equipment suppliers, have been filed in the U.S. District Court for the Middle District of Pennsylvania which sits in Harrisburg. The class action suit is a consolidated class action consisting of 73 named plaintiffs and seeks damages to $560 million - the Price-Anderson Act limitation. In addition to seeking damages, all parties included in this action ask for abatement of a nuisance (the Three Mile Island plant) creation of a trust to guarantee payments of future medical services and "such other relief as is just and proper."

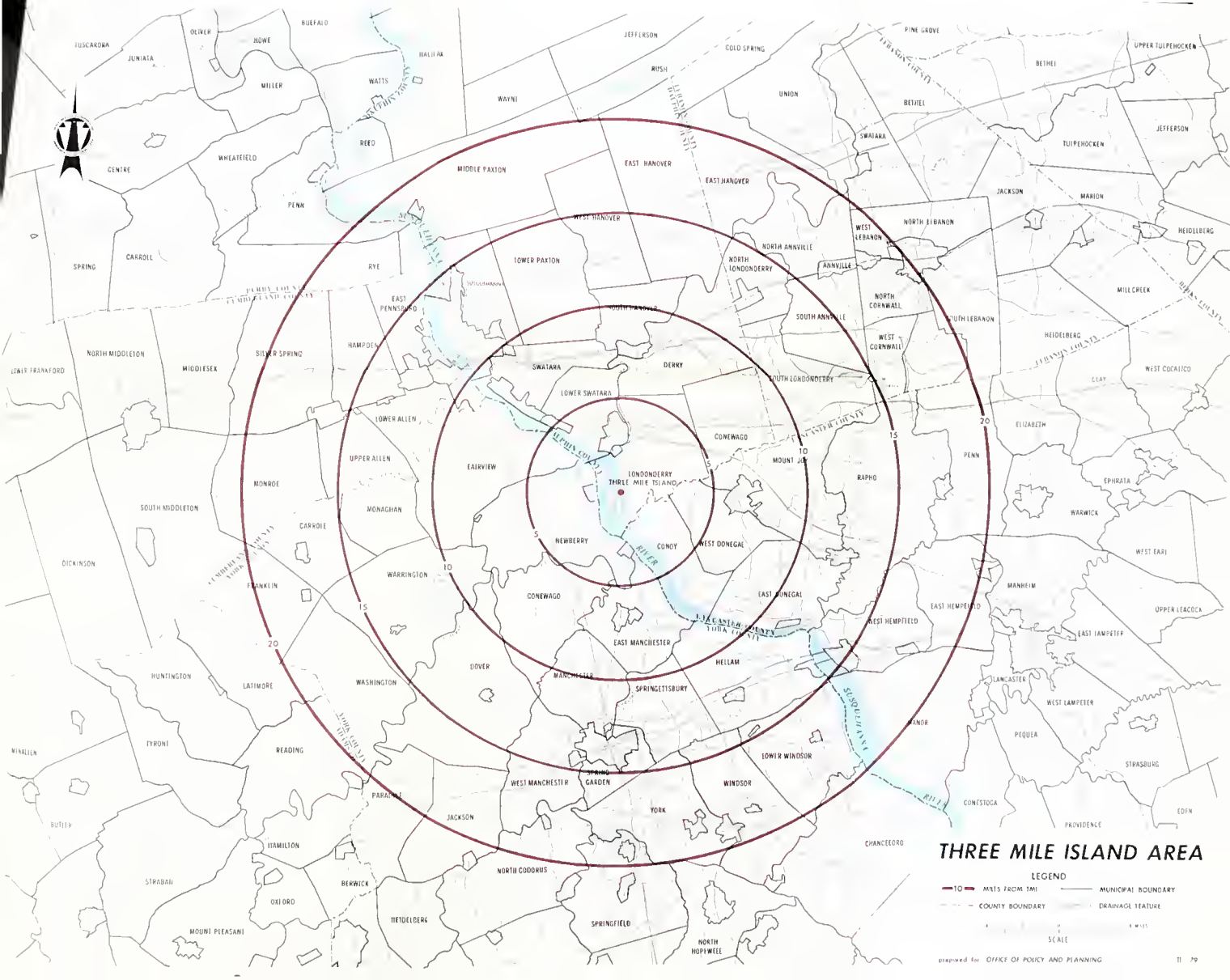
The 18 individual suits generally seek damages, where specified, in excess of $10,000 in compensatory, and in excess of $10,000 for punitive damages.

For all suits a twenty year statute of limitations rule applies under Nuclear Regulatory Commission rules.

Agricultural Community Concern - The Agriculture Department's study indicated that the short term impacts concerning losses is not the major concern of the farmers. A far more prevalent concern is the long term implications associated with their proximity to the TMI nuclear facility. Its presence, they feel, poses a serious threat to their general health and livelihood.

In regard to health factors, almost 50 percent of the farmers living within 10 miles either feel threatened or remain uncertain about potential health effects. Outside the 10 mile radius, one-third of the farmers expressed similar feelings. In addition, about one-fourth of the farmers participating in the Department's study felt that the TMI facility is a serious threat to their livelihood. This concern is almost uniformly distributed among farmers in the entire 25 mile radius.

Related to the above concern is the fact that some farmers feel that the incident has affected the value of their farm. Nearly half of them feel that this is a long term effect. The results of the Department's study therefore indicate that there is a significant amount of apprehensiveness within the agricultural community regarding TMI as it could affect the health of the farm family, the farmer's livelihood, and farm real estate values. This concern is most keenly felt by those farmers living and farming close to the facility. One of the reasons for this attitude, most certainly, is the farmers' dependence on an undisturbed land and water environment. A radiation free environment is essential to the farmer and his sense of well being. The farmer makes a large capital investment in his land, facilities and livestock, and, of course, he also invests his time. For this reason, he is less able or less willing to evacuate his farmstead. While a farmer who grows fruits, vegetables, grain or forage can leave the area during a crisis, the livestock, dairy and poultry farmer finds it difficult to leave his animals unattended without suffering potential serious financial losses. Virtually none of the latter group made plans to evacuate their livestock during the TMI incident. Even for those farm families which evacuated, or made plans to do so, the higher incidence was associated with the grain and the fruit and vegetable farmers.


THREE MILE ISLAND AREA
LEGEND
10 MILES FROM TMI
MUNICIPAL BOUNDARY
COUNTY BOUNDARY
DRAINAGE FEATURE
SCALE
prepared for OFFICE OF POLICY AND PLANNING
LONDONDERRY
THREE MILE ISLAND
SUSQUEHANNA RIVER
SUSQUEHANNA
TUSCARORA
JUNIATA
OLIVER
HOWE
BUFFALO
HALIFAX
JEFFERSON
COLD SPRING
PINE GROVE
UPPER TULPEHOCKEN
BETHEL
MILLER
WATTS
WAYNE
RUSH
UNION
BETHEL
SWATARA
TULPEHOCKEN
JEFFERSON
CENTRE
WHEATFIELD
REED
MIDDLE PAXTON
EAST HANOVER
EAST HANOVER
JACKSON
MARION
PENN
WEST HANOVER
WEST LEBANON
NORTH LEBANON
HEIDELBERG
SPRING
CARROLL
RYE
LOWER PAXTON
NORTH ANNVILLE
NORTH LONDONDERRY
ANNVILLE
MILL CREEK
EAST PENNSBORO
SOUTH HANOVER
NORTH CORNWALL
SOUTH ANNVILLE
SOUTH LEBANON
HEIDELBERG
NORTH MIDDLETON
SILVER SPRING
HAMPDEN
WEST CORNWALL
LOWER FRANKFORD
MIDDLESEX
SWATARA
DERRY
SOUTH LONDONDERRY
WEST COCALICO
LOWER SWATARA
CLAY
LOWER ALLEN
CONEWAGO
ELIZABETH
UPPER ALLEN
EAIRVIEW
MOUNT JOY
PENN
MONROE
RAPHO
EPHRATA
SOUTH MIDDLETON
MONAGHAN
WARWICK
CARROLL
NEWBERRY
CONOY
WEST DONEGAL
WEST EARL
DICKINSON
WARRINGTON
FRANKLIN
CONEWAGO
EAST DONEGAL
MANHEIM
EAST HEMPFIELD
UPPER LEACOCK
WEST HEMPFIELD
EAST MANCHESTER
EAST LAMPETER
HELLAM
DOVER
HUNTINGTON
LATIMORE
WASHINGTON
MANCHESTER
SPRINGETTSBURY
LANCASTER
WEST LAMPETER
MANOR
PEQUEA
TYRONE
READING
LOWER WINDSOR
STRASBURG
WEST MANCHESTER
SPRING GARDEN
WINDSOR
PARADISE
YORK
CONESTOGA
EDEN
JACKSON
PROVIDENCE
BUTLER
HAMILTON
CHANCEFORD
NORTH CODORUS
STRABAN
BERWICK
OXFORD
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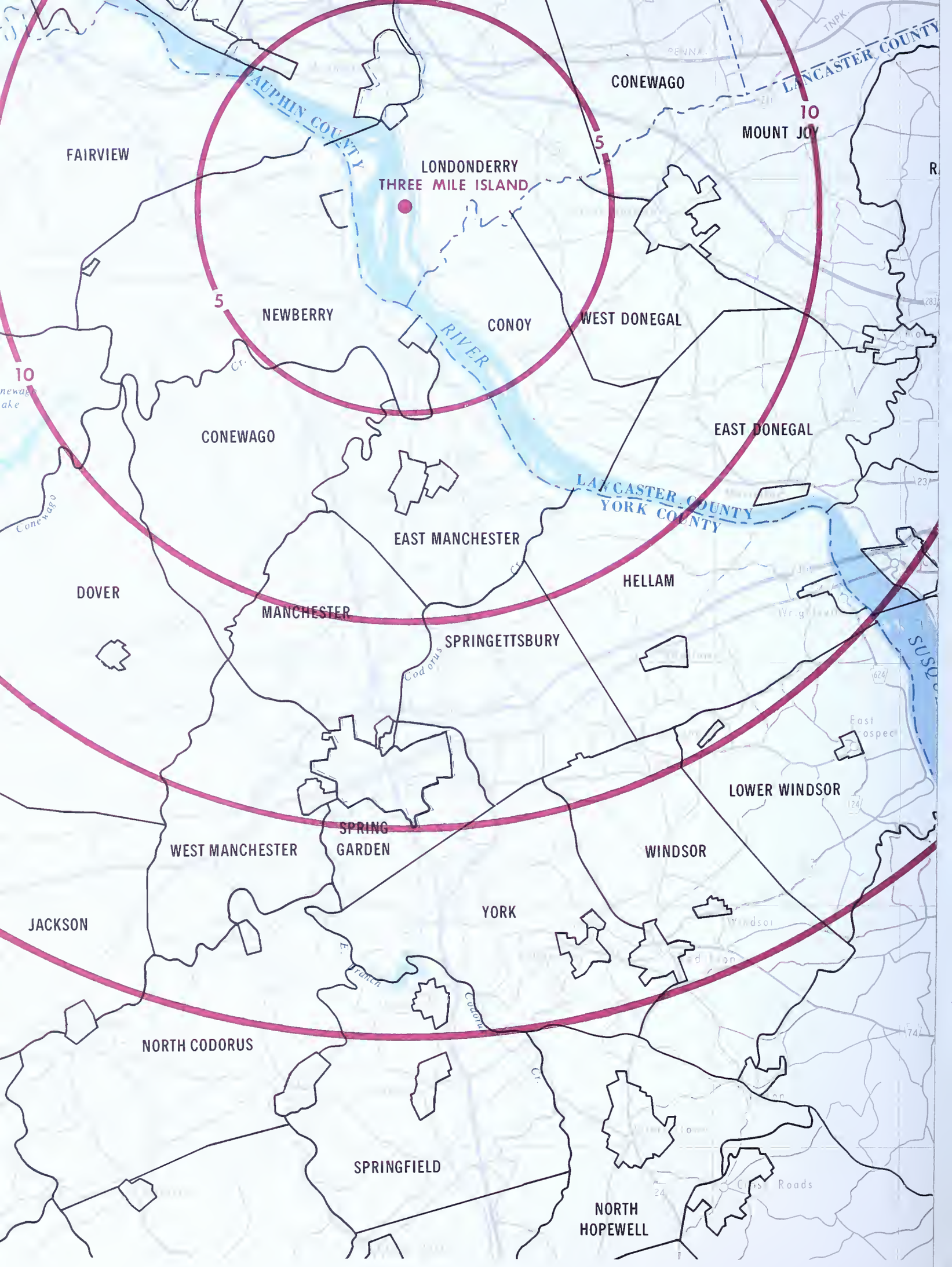
DAUPHIN COUNTY
LANCASTER COUNTY
YORK COUNTY
CONEWAGO
MOUNT JOY
FAIRVIEW
LONDONDERRY
THREE MILE ISLAND
NEWBERRY
CONOY
WEST DONEGAL
EAST DONEGAL
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SPRINGETTSBURY
LOWER WINDSOR
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WEST MANCHESTER
WINDSOR
YORK
JACKSON
NORTH CODORUS
SPRINGFIELD
NORTH
HOPEWELL

WERT
BOOKBINDING
MIDDLETOWN, PA
MAY 83